A/C REFRIGERANT SYSTEM

SAFETY MEASURES

The subassemblies and lines of the air conditioner are filled with Tetrafluoroethane also known as refrigerant R-134a.

A label on the lock carrier in the engine compartment indicates the refrigerant type and capacity.

WARNING:

- **Always use an Underwriter's Laboratory (UL) approved refrigerant recovery/recycling/recharging unit such as Kent-Moore ACR^4 , or equivalent, whenever discharging an R-134a A/C system.**
- **As of January, 1992 any person who services a motor vehicle air conditioner MUST, by law, be properly trained and certified and use approved refrigerant recycling equipment. Technicians must complete an EPA approved recycling course to be certified.**
- **State and Provincial governments may have additional requirements regarding air conditioning servicing. Always comply with local laws.**

WARNING: A/C system is filled with refrigerant gas which is under pressure. Always be careful that refrigerant does not come in contact with your skin. If liquid refrigerant has come in contact with your skin or eyes:

- **Do not rub skin or eyes**
- **Immediately flush with cool water for 15 minutes**
- **Rush to a doctor or hospital**
- **Do not attempt to treat yourself**
- **Work in a well ventilated area because refrigerant gases are heavier than air, displace oxygen and may cause suffocation in areas of poor air circulation, like under the car.**
- **Avoid breathing refrigerant vapors. Exposure may irritate eyes, nose and throat. Always wear hand and eye protection (gloves and goggles) when working around the A/C system. Keep refrigerant containers stored below 50 °C (122 °F) and never drop from high places. DO NOT warm refrigerant containers with an open flame. If refrigerant needs to be warmed, place bottom of tank in warm water.**
- **Keep refrigerant away from open flames because poisonous gas will be produced if it burns. Do not smoke when refrigerant gases are present for the same reason.**

WARNING:

- **Electric welding near refrigerant hoses causes R-134a to decompose from ultraviolet light. Discharge system before electric welding.**
- **Pressurized R-134a refrigerant in the presence of oxygen may form a combustible mixture. Never introduce compressed air into any R-134a container (full or empty), A/C component or piece of service equipment**
- **Do not expose any component of the A/C system to high temperatures (for example, open flames). Excessive heat will cause a pressure increase which could burst the system.**
- **Do not steam clean condensers or evaporators. Use only cold water or compressed air.**

CAUTION:

- **Before working on electrical system, obtain radio security code and disconnect battery Ground (GND) strap.**
- **When reconnecting battery, always check operation of vehicle equipment such as radio, clock, and power windows according to Repair Manual and/or Owner's Manual.**
- **R-12 and R-134a refrigerant are NOT compatible. Never add R-12 refrigerant to an R-134a system or R-134a refrigerant to an R-12 system. If the refrigerants are mixed, total system contamination will occur and compressor failure may result.**
- **Refrigerant oils used for the R-134a system and R-12 system are NOT compatible. Use only the specified synthetic oil (Polyalkylene Glycol/PAG) for the R-134a refrigerant system. DO NOT use R-12 system oil in an R-134a system or R-134a system oil in an R-12 system. If the refrigerant oils are mixed, system contamination will occur and compressor failure may result.**
- **R-134a refrigerant system oil (PAG oil) absorbs moisture very rapidly. Moisture combines with the refrigerant to form acids which will damage the system. Use only the specified oil from a sealed container and ALWAYS reseal oil container immediately after use. DO NOT use oil if it has become contaminated with moisture.**

CAUTION:

- **Immediately plug open connections on A/C components to prevent dirt and moisture contamination. Likewise, DO NOT remove new components from packaging until ready to install. Immediately tighten component connections after installation.**
- **Always use separate refrigerant recovery/recycling/recharging servicing equipment for R-12 and R-134a systems. DO NOT use one piece of equipment for both R-12 and R-134a systems. The residual traces of refrigerant will contaminate and damage the equipment. Servicing equipment includes recovery/recycling/recharging unit, charging station, vacuum pump, manifold gauges, etc.**

- **DO NOT use R-12 servicing equipment on R-134a systems or R-134a equipment on R-12 systems or damage to both the vehicle A/C system and servicing equipment may result. Use only equipment designed to meet Society of Automotive Engineers (SAE) standards.**

CAUTION:

- **R-134a and R-12 systems use different size service fittings. NEVER use adaptors to convert an R-12 fitting to R-134a size or R-134a fitting to R-12 size.**
- **R-134a and R-12 A/C components including compressor, hoses, O-rings, evaporator, condenser, receiver-drier, etc. are NOT interchangeable. Components of the R-134a system are identified by lettering (R-134a) or by a green label (or stripe). In addition a label on the upper radiator support identifies which type refrigerant is used. Use only the correct system component for each refrigerant type.**

CAUTION:

- **Always replace damaged and/or leaking A/C system components. Do not attempt repair by soldering or welding.**
- **Work area must be extremely clean when working on A/C system components.**
- **Discharge A/C system before removing any A/C system component.**
- **Always reinstall caps over A/C service valves.**
- **Always replace O-rings, DO NOT reuse. Use only the correct size and type of O-rings specified for use with R-134a refrigerant. Lubricate O-ring with refrigerant oil before installing.**

A/C REFRIGERANT R-134A, PROPERTIES

Commercial designation

The following designations are used and appear on component labels and factor tags:

- R-134a
- Tetrafluoroethane
- CH_2 F CF_3
- H-KW 134a
- SUVA (R) 134a
- ARCTON (R) 134a

Color

Refrigerant R-134a is colorless and is invisible as a gas. R-134a when viewed through the sight glass may appear milky due to the mixture of refrigerant and lubricating oil (PAG oil).

Temperature/pressure relationship

R-134a in an enclosed container will have a specific temperature/pressure relationship.

R-134a TEMPERATURE/PRESSURE RELATIONSHIP

Temperature in °C (°F)	Pressure in bar (psi)
-30 (-22)	0.0 (0.0)
-20 (-4)	0.3 (4.4)
-10 (14)	1.0 (14.5)
0 (32)	1.9 (27.5)
10 (50)	3.1 (45.0)
20 (68)	4.7 (68.2)
30 (86)	6.7 (97.2)
40 (104)	9.1 (132.0)
50 (122)	12.2 (177.0)
60 (140)	15.8 (229.2)
70 (158)	20.2 (293.0)

Refrigerant oil

A special Polyalkylene Glycol (PAG) synthetic oil is used in R-134a systems. This oil is NOT compatible with mineral based oils used in R-12 systems. Refer to Cautions and Warnings regarding proper oil usage, See **A/C refrigerant system** .

Airborne properties

Escaped refrigerant gases are heavier than air and will gather first in low places, like under the car. R-134a refrigerant gas displaces oxygen and may cause suffocation in low areas of poor air circulation.

Refrigerant R-134a is not poisonous in any state (liquid or gas) and is safe when used properly.

Affects on plastic

Refrigerant R-134a will deteriorate some plastics. Therefore, when making system repairs, use only genuine VW replacement parts which are specified for use with R-134a refrigerant.

Affects on metal

In its pure state, refrigerant R-134a is chemically stable and will not attack iron, copper, brass or aluminum. However, the mixture of R-134a and PAG oil may deteriorate certain metals (copper). Therefore, when making system repairs, use only genuine VW replacement parts which are specified for use with R-134a refrigerant.

Water solubility

Liquid R-134a refrigerant will absorb only very minute quantities of moisture. However, R-134a vapor can

absorb large amounts of moisture.

Flammability

R-134a refrigerant is not flammable.

Refrigerant containers

DO NOTexceed maximum rated capacity of refrigerant container.

Leak detection

Use halogen leak detector Hitec HI400A-TELor equivalent to check for R-134a system leaks. This tool can also be used to detect leaks in R-12 systems. Many currently available R-12 leak detectors cannot detect R-134a refrigerant leaks.

R-134a refrigerant oil

A special Polyalkylene Glycol (PAG) synthetic oil is used in R-134a systems. This oil is NOT compatible with mineral based oils used in R-12 systems.

A/C REFRIGERANT SYSTEM, IDENTIFICATION

NOTE: Before carrying out any work on the A/C refrigerant system, refer to A/C system safety measures, See A/C refrigerant system .

A/C refrigerant systems on New Beetle models are charged with refrigerant R-134a.

A label specifying refrigerant type may be located on the compressor or radiator support.

A/C refrigerant circuit with expansion valve and receiver drier

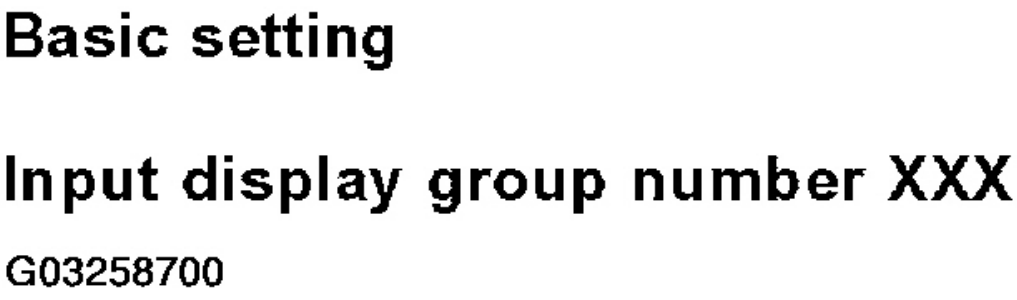


Fig. 1: Identifying A/C Refrigerant Circuit With Expansion Valve And Receiver Drier
Courtesy of VOLKSWAGEN OF AMERICA, INC.

NOTE: Arrows in Fig. 1 indicate direction of refrigerant flow.

A/C REFRIGERANT SYSTEM, COMPONENT OVERVIEW

Basic setting 93 ON <8>

System test activated OK

G03258701

Fig. 2: Identifying Compressor
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Compressor

The compressor is driven via a belt on the engine when the A/C clutch engages (A/C "ON").

Low-pressure refrigerant gas from the evaporator is compressed by the compressor. After compression, the refrigerant gas (now high-pressure) flows to the condenser.

NOTE:

- **The compressor contains refrigerant oil that is mixable under all temperatures with the refrigerant.**
- **A label on the compressor indicates that compressor is for R-134a systems only.**

Condenser

The condenser transfers heat from the compressed refrigerant gas to the outside air which causes the refrigerant to change state from a gas to a liquid.

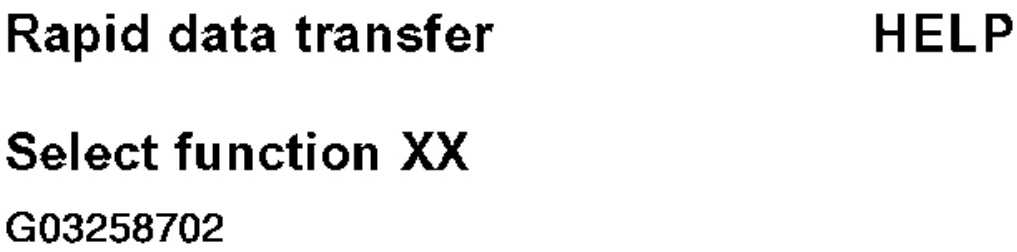


Fig. 3: Identifying Condenser
Courtesy of VOLKSWAGEN OF AMERICA, INC.

NOTE: The condenser for the R-134a refrigerant system is identified with a green label.

Receiver drier

The receiver drier acts as a refrigerant reservoir for the system. Any moisture in the system is absorbed in the drier desiccant.

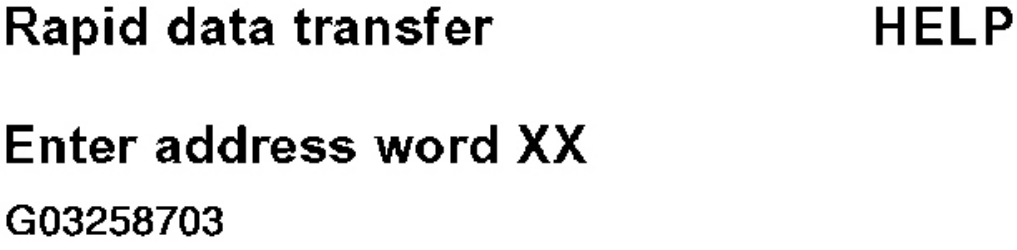


Fig. 4: Identifying Receiver Drier
Courtesy of VOLKSWAGEN OF AMERICA, INC.

CAUTION: The receiver drier may be identified with a green R-134a label and MUST NOT be used in R-12 systems (the drier desiccant inside is only compatible with R-134a refrigerant). Likewise, NEVER use an R-12 receiver drier in and R-134a system.

Sight glass (if equipped)

With a properly charged A/C system and A/C clutch engaged, the sight glass -arrow- should remain clear and bubble free.

Fig. 5: Locating Sight Glass
Courtesy of VOLKSWAGEN OF AMERICA, INC.

NOTE:

- **The mixture of R-134a refrigerant and refrigerant (PAG) oil may appear milky in the sight glass.**
- **If equipped, sight glass location may not be as illustrated in Fig. 5 .**

Expansion valve

The expansion valve restricts and controls refrigerant flow to the evaporator thus lowering refrigerant temperature and pressure.

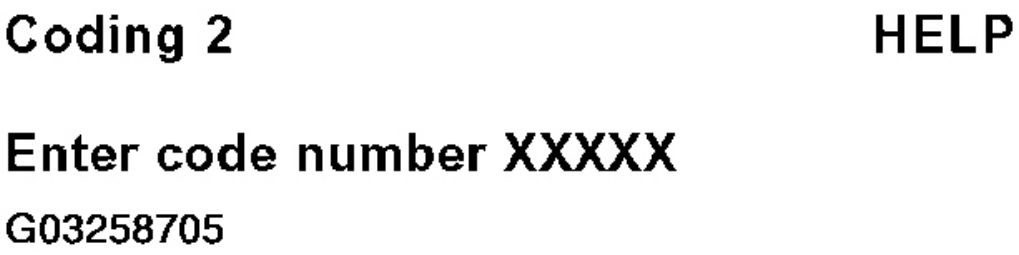


Fig. 6: Identifying Expansion Valve
Courtesy of VOLKSWAGEN OF AMERICA, INC.

NOTE: The R-134a expansion valve may be identified with a green label.

Evaporator

Liquid refrigerant entering the evaporator absorbs heat from air passing through the evaporator fins and cools the air. As the refrigerant absorbs heat it turns to vapor and then is suctioned by the compressor.

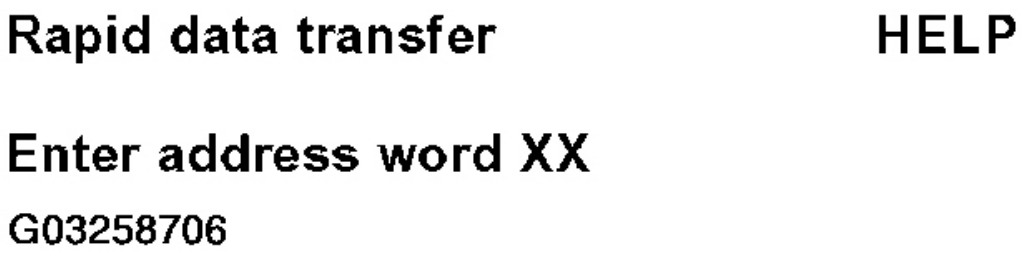


Fig. 7: Identifying Evaporator
Courtesy of VOLKSWAGEN OF AMERICA, INC.

O-rings

O-rings seal connections between A/C system components.

Fig. 8: Identifying Dimension Of O-Rings
Courtesy of VOLKSWAGEN OF AMERICA, INC.

NOTE:

- **Always use correct size O-rings (dimensions -a- and -b-).**
- **Do not reuse O-rings, always replace. Use only new O-rings that are**

compatible with R-134a refrigerant and refrigerant (PAG) oil on R-134a systems.

- **O-rings for use only on R-134a systems may be color coded: red, green, violet or black.**
- **Lubricate O-rings with the appropriate refrigerant oil before installing (only use PAG oil).**

Pressure relief valve

The pressure relief valve is mounted on the compressor or compressor inlet/outlet manifold. At pressures above 40 bar (580 psi), the pressure relief valve opens to vent excessive pressure. When the system pressure is reduced, the valve closes to prevent total refrigerant loss.

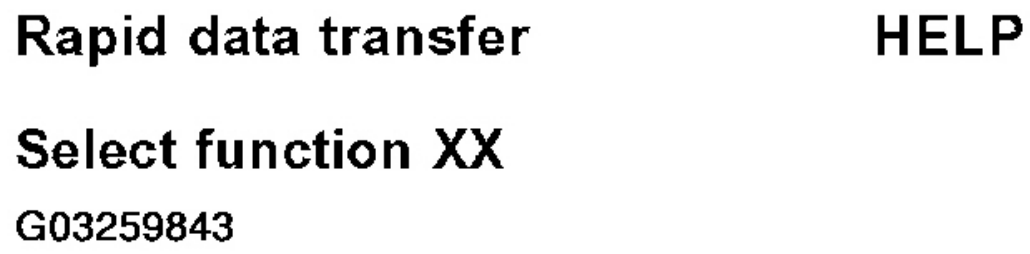


Fig. 9: Identifying Pressure Relief Valve
Courtesy of VOLKSWAGEN OF AMERICA, INC.

On some models, a cap on the pressure relief valve will pop out if the valve has opened.

A/C pressure switch -F129-

NOTE: Depending on engine type, refrigerant systems have either an A/C pressure switch -F129- or high pressure sensor -G65- installed. Refer to system wiring diagrams.

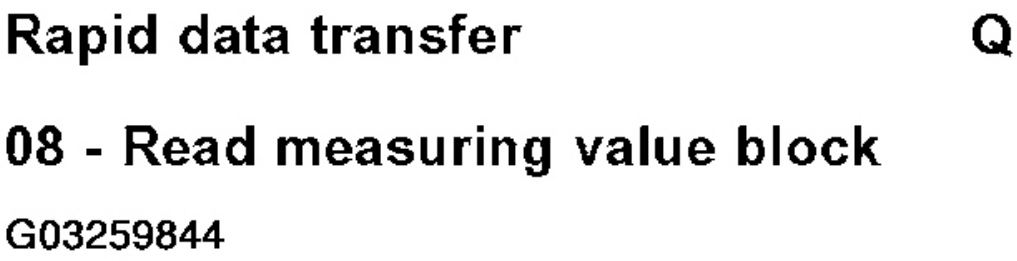


Fig. 10: Identifying A/C Pressure Switch -F129-
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Switch -F129- has three functions:

- Switches the A/C clutch -N25- off when excessive refrigerant circuit pressure is present (e.g.: insufficient air flow over condensor or when overcharged).
- Switches the A/C clutch -N25- off when insufficient refrigerant circuit pressure is present (e.g.: when refrigerant has leaked out).
- Switches on the second speed coolant fan -V7- when refrigerant circuit pressure increases.

High pressure sensor -G65-

NOTE: Depending on engine type, refrigerant systems have either an A/C pressure switch -F129- or high pressure sensor -G65- installed. Refer to system wiring diagrams.

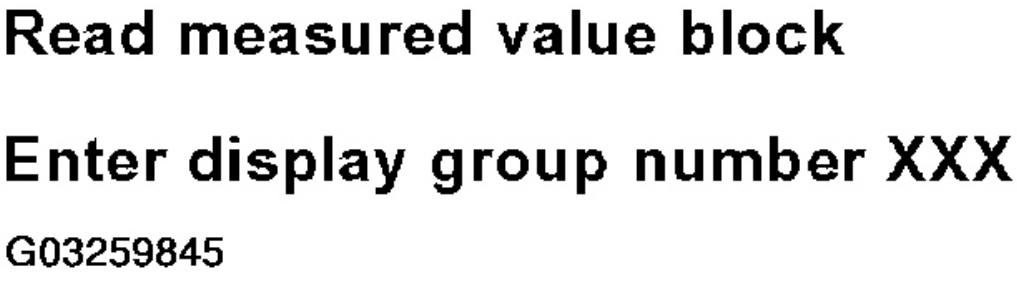


Fig. 11: Identifying High Pressure Sensor -G65-

Courtesy of VOLKSWAGEN OF AMERICA, INC.

Sensor -G65- -B-, transmits a square wave signal to Coolant Fan Control (FC) Module -J293- at a rate which varies according to the refrigerant system pressure. The signal is processed as follows:

Based on the signal transmitted by -G65-, -J293- determines the A/C refrigerant system pressure and controls A/C clutch -N25- and coolant fan functions accordingly. For example:

- Switches the radiator fan -V7- to the next higher speed when pressure in the refrigerant circuit increase.
- Switches off A/C clutch -N25- when pressure is excessive (for example when engine cooling is insufficient).
- Switches off A/C clutch -N25- off when pressure is too low (for example with low/no refrigerant).

The -G65- signal is also input to the Motronic Engine Control Module (ECM). As the amount of torque needed to drive the A/C compressor varies according to refrigerant system pressure, the ECM processes this signal in order to enhance engine performance. Depending on the type of ECM, this signal may or may not appear as a duty cycle on the read measuring value block display (function 08).

For -G65- signal, checking, see **High pressure sensor -G65-** .

A/C system hoses and lines

The mixture of refrigerant oil (PAG oil) and refrigerant R-134a attacks some metals and alloys (for example, copper) and breaks down certain hose material. Use only hoses and lines that are identified with a green mark (stripe) or the lettering "R-134a".

Hoses and lines are fastened together with threaded couplings/fittings and are retained (to bodywork or components) with specially isolated hose clamps.

NOTE:

- **During servicing, all couplings, fittings and related fasteners must be torqued to specifications. See A/C refrigerant system, replacing components .**
- **Ensure that only special tools (as specified) are used while servicing.**

A/C REFRIGERANT SYSTEM, REPLACING COMPONENTS

Replacement A/C compressors, evaporators and condensers supplied by the Parts Dept. are filled with Nitrogen. If gas (Nitrogen) does not escape when component is first opened, the component may be faulty (leaking), do not install.

Replacement A/C compressors are filled with the total refrigerant oil quantity needed for the entire refrigerant system.

Always replace the receiver drier whenever the refrigerant system has been left open. Install immediately after opening to prevent moisture contamination of drier desiccant. Moreover, keep refrigerant system and other

replacement components sealed for as long as possible to minimize the chance of dirt and moisture contamination.

Always plug open refrigerant line connections to prevent dirt and moisture contamination.

If the system has been discharged due to a damaged or leaking component (refrigerant hose/line, compressor, evaporator, condenser, etc.), flush the refrigerant system first with compressed air, then with nitrogen (available locally) and collect the oil that runs out. This will remove the refrigerant oil which may be saturated with moisture.

CAUTION: DO NOT flush R-134a refrigerant system with R-11. R-11 is not compatible with refrigerant R-134a and PAG oil and will cause total system contamination. If the compressor is not replaced after flushing the system, fill compressor with the correct type and quantity of refrigerant oil as specified under A/C system capacities, See A/C refrigerant system, capacities . Fill compressor with the total system oil capacity.

If the compressor is replaced, do not add any additional oil as the total amount of oil required is already in the compressor.

Dispose of contaminated refrigerant oil following laws governing hazardous waste disposal. Do not combine any refrigerant oil with any other old oils such as engine oil or transmission fluid.

Follow all applicable Warnings and Cautions when working on the A/C system.

A/C REFRIGERANT SYSTEM, SERVICING

NOTE:

- **Before carrying out any work on the A/C refrigerant system, refer to A/C refrigerant system safety measures, See A/C refrigerant system .**
- **Except where indicated with *, all system components illustrated must only be serviced or replaced after discharging refrigerant system.**

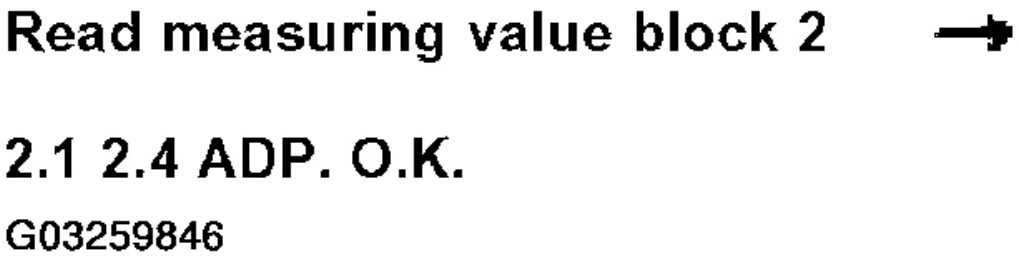


Fig. 12: A/C Refrigerant System Components (Engine Compartment)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

NOTE: The following list refers to items in Fig. 12 .

1. **Damper**
2. **Refrigerant hose**
3. **Refrigerant pipe**
4. **Refrigerant pipe**
   - From receiver drier to expansion valve
5. **High pressure service valve**
   - Only use Kent Moore ACR4 or equivalent
6. **A/C pressure switch -F129- (4-Pin) or high pressure sensor -G65- (3-Pin) ***
   - Depending on engine type, refrigerant systems have either an A/C pressure switch -F129- or high pressure sensor -G65- installed. Refer to system wiring diagrams.
   - Checking -F129-, See **A/C pressure switch -F129-, checking**
   - Checking -G65-, See **High pressure sensor -G65-**
   - Removing and installing, See **Removing And Installing A/C Pressure Switch -F129- And High Pressure Sensor -G65-**
   - Component can be removed without discharging refrigerant system
7. **Expansion valve**
8. **Evaporator**
   - In heater/evaporator unit
   - Removing, See **Heater/evaporator unit, disassembly and assembly**
9. **Refrigerant hose**
10. **Refrigerant hose**
    - From compressor to condenser
11. **Condenser**
    - Removing and installing, See **Condenser, removing and installing**
12. **Pressure relief valve**
    - On compressor
    - Checking, See **Fig. 13**
13. **Compressor**
    - Sanden SD7-V16
14. **A/C clutch -N25-***
    - Clutch assembly can be serviced without discharging refrigerant system.
    - Servicing, See **A/C clutch -N25-, servicing (Sanden)** .
15. **Receiver drier**

PRESSURE RELIEF VALVE

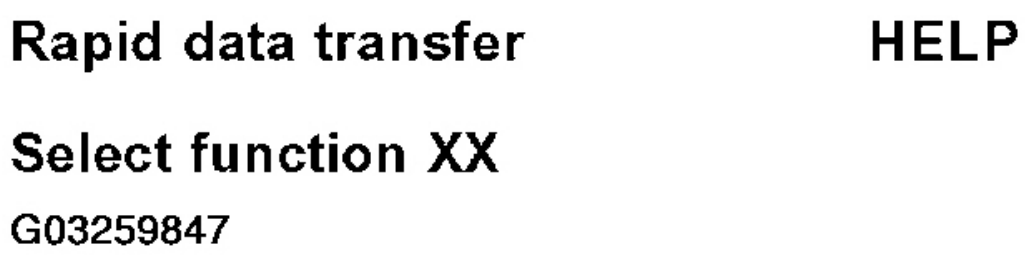


Fig. 13: Locating Pressure Relief Valve
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Function: Protects refrigerant circuit from overpressure. See **Fig. 13** .
- The pressure relief valve plug indicates if valve has opened to release pressure -arrow-. An adhesive plate is pushed out.

A/C PRESSURE SWITCH - F129-

A/C pressure switch -F129-, checking

Visual check: Ensure that O-ring (color: red) 10.8mm x 1.8mm is seated in groove.

Fig. 14: A/C Pressure Switch - F129-
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Switch function between contacts -T4a/1- and -T4a/2- (at connector housing) switches A/C clutch -N25- off whenever:

- excessive refrigerant circuit pressure is present (e.g.: insufficient air flow over condensor or if system is overcharged)
- insufficient refrigerant circuit pressure is present (e.g.: when refrigerant has leaked out).

Switch function between contacts -T4a/3- and -T4a/4- (at connector housing) switches coolant fan -V7- to 2nd speed when refrigerant pressure rises.

Switching conditions

- Contacts -1- and -2- open below 1.2 bar (17.4 psi) and closed above 2.4 bar (34.8 psi) switching threshold
- Contacts -1- and -2- open above 32 bar (464 psi) and closed below 24 bar (348 psi) switching threshold
- Contacts -3- and -4- closed above 16 bar (232 psi) and open below 12.5 bar (181.2 psi) switching threshold

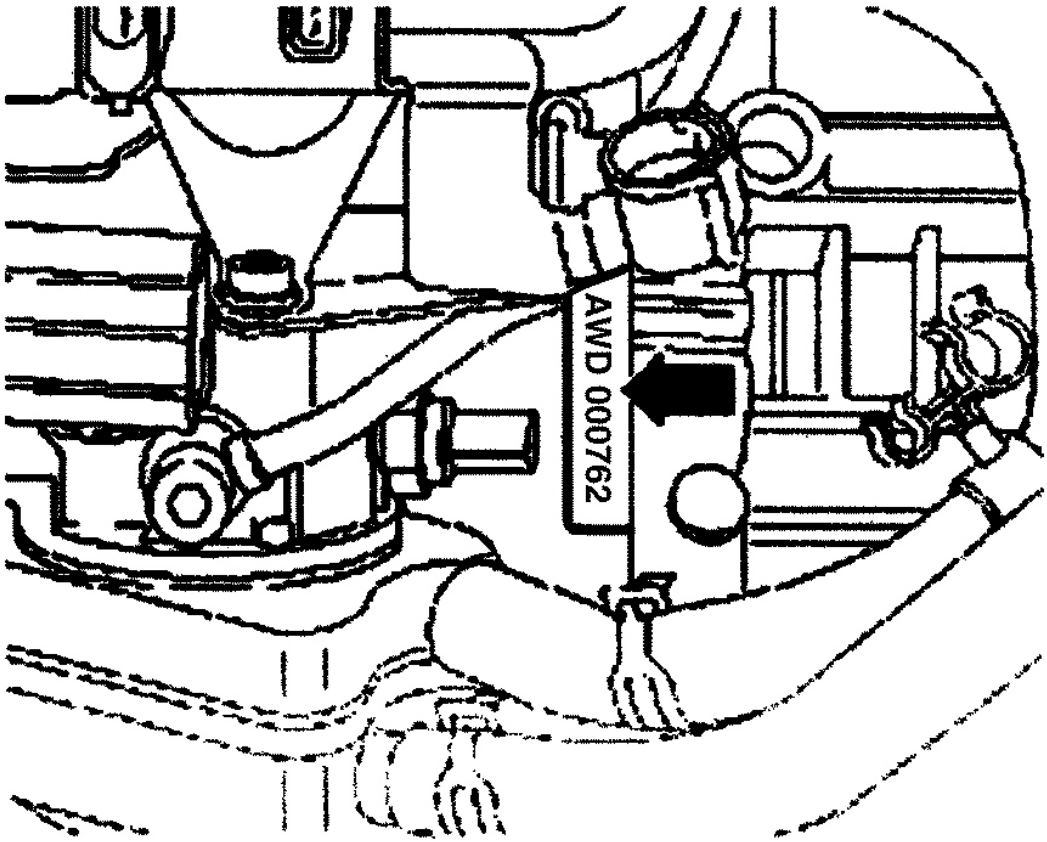


Fig. 15: A/C Pressure Switch - F129
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Checking switch function

Bridge contacts -1- and -2- with engine running. If A/C clutch -N25- switches on, refrigerant system may be empty, See **A/C refrigerant system, testing with pressure gauges** .

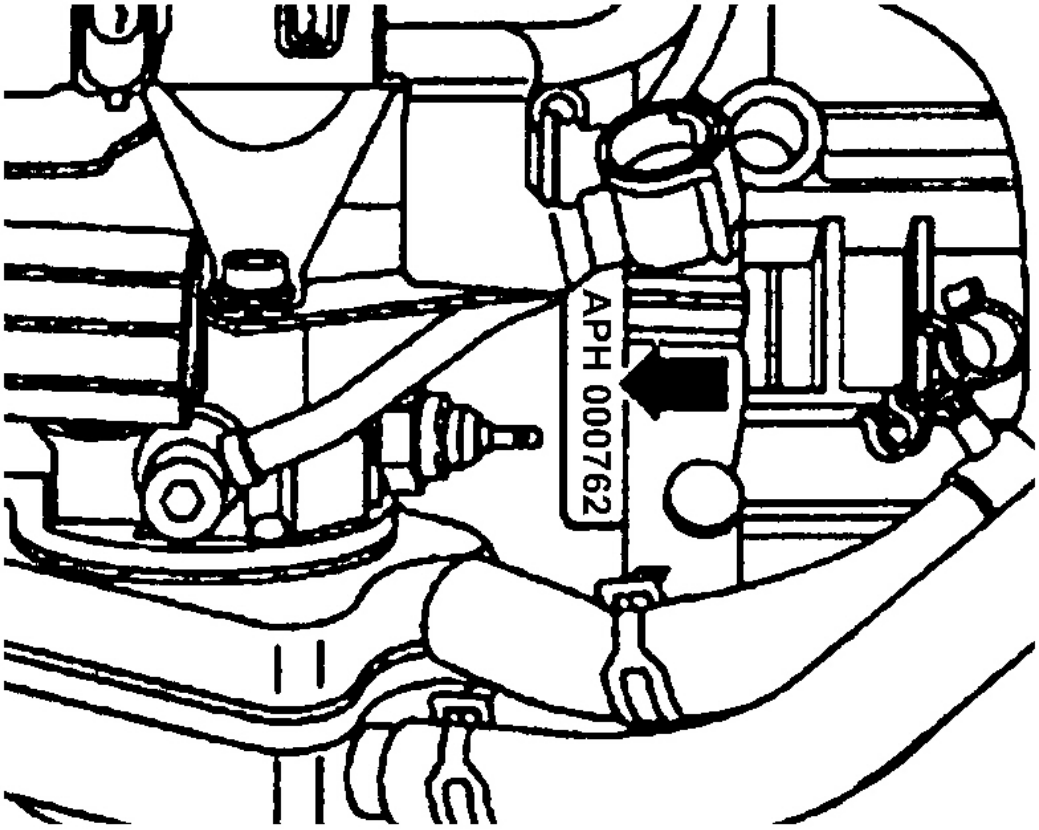


Fig. 16: A/C Pressure Switch - F129
Courtesy of VOLKSWAGEN OF AMERICA, INC.

HIGH PRESSURE SENSOR -G65-

Function

Where equipped, the high pressure sensor -G65- -B-, transmits a square wave signal to Coolant Fan Control (FC) Module -J293- at a rate which varies according to the refrigerant system pressure.

The signal from -G65- is processed as follows:

Based on the pulse rate transmitted by -G65-, -J293- determines the A/C refrigerant system pressure and controls the function of the A/C clutch -N25- and coolant fan (s) accordingly. For example:

- Switches the radiator fan -V7- to the next higher speed when pressure in the refrigerant circuit increases.
- Switches off A/C clutch -N25- when pressure is excessive (for example when engine cooling is insufficient).
- Switches off A/C clutch -N25- off when pressure is too low (for example with low/no refrigerant).

The signal generated by high pressure sensor -G65- is also provided as an input to the Motronic Engine Control Module (ECM). As the amount of torque needed to drive the A/C compressor varies according to the refrigerant system pressure, the ECM processes this signal in order to enhance engine performance. Depending on the type of ECM, this signal may or may not appear as a duty cycle on the read measuring value block display (function 08).

High pressure sensor -G65-, pin assignments

- Contact 1: Ground (GND)
- Contact 2: Square wave signal (output) to Coolant Fan Control (FC) Module -J293- and Motronic Engine Control Module (ECM) -J220-
- Contact 3: Terminal 15 (ignition on)

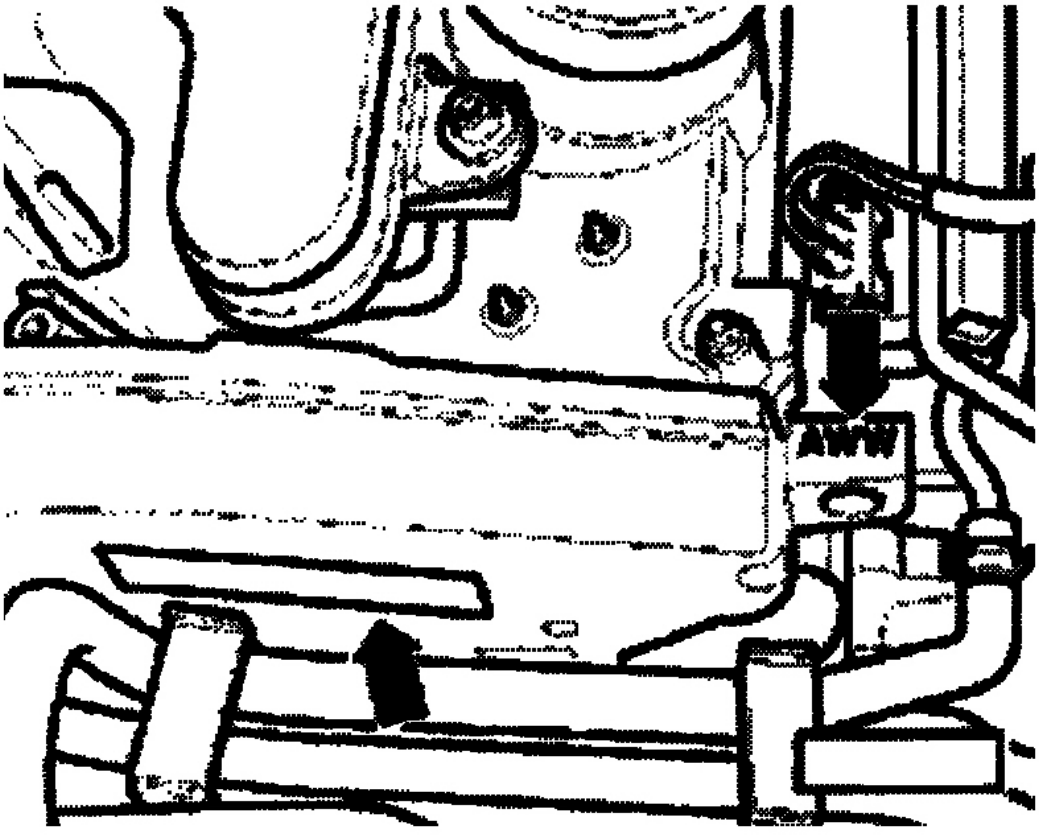


Fig. 17: Pin Assignments Of High Pressure Sensor -G65
Courtesy of VOLKSWAGEN OF AMERICA, INC.

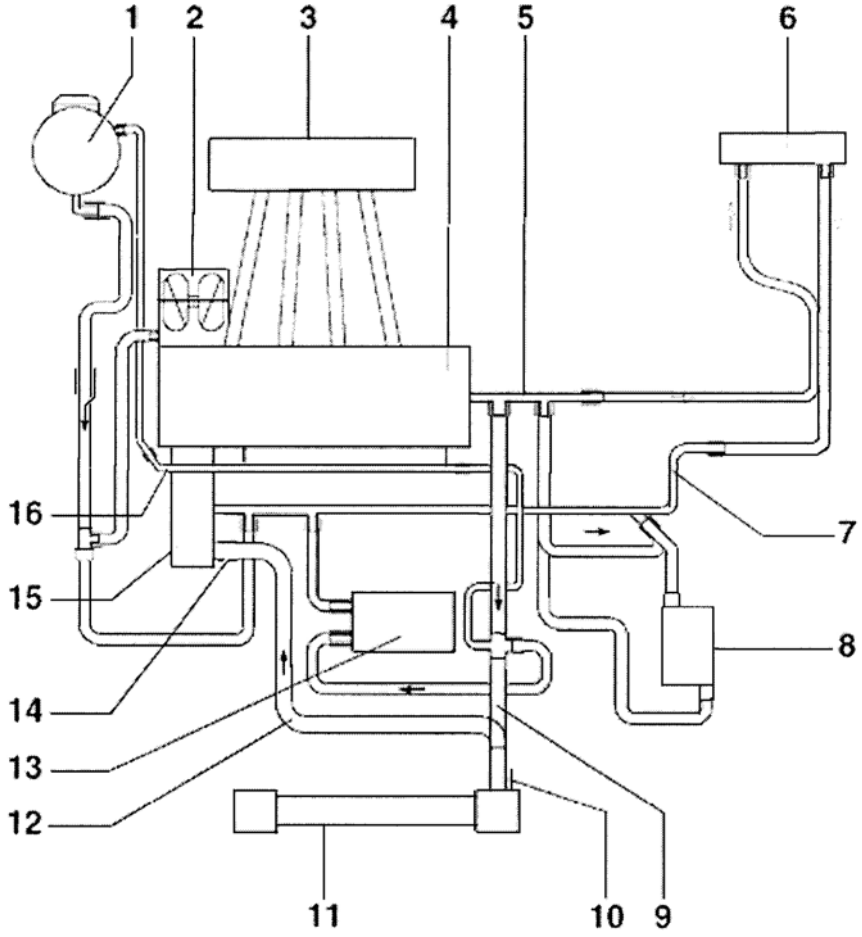
NOTE: A/C clutch -N25- is switched off when connector -B- is disconnected

Electrical checks

- Check voltage and ground supply to -G65- using wiring diagram.
- Check wiring for short to one another.
- Check wiring for short to B+ and ground.
- Check wiring for short circuit between -G65- and -J293- using wiring diagram.
- If no wiring faults can be determined, replace -G65-.

Removing And Installing A/C Pressure Switch -F129- And High Pressure Sensor -G65-

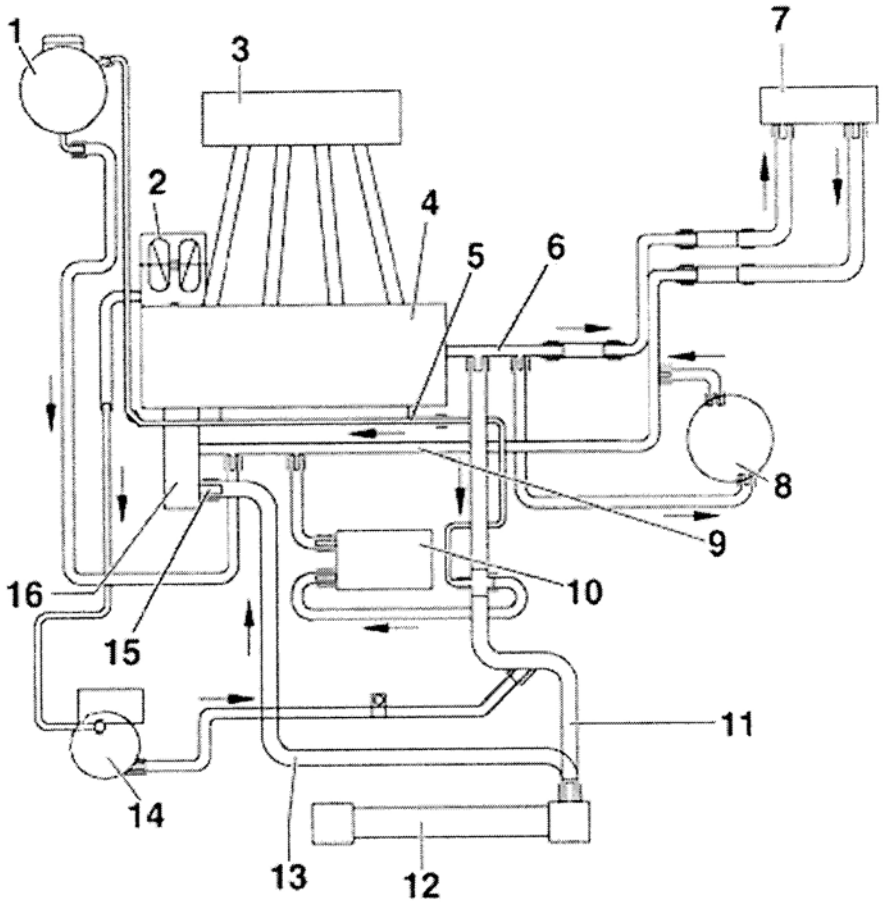
NOTE: **Component can be removed without discharging refrigerant system.**



1. Expansion Tank
2. Turbocharger
3. Intake Manifold
4. Cylinder Head/Cylinder Block
5. Connection
6. Heat Exchanger
7. Lower Coolant Pipe
8. Transmission Oil Cooler (Engine Code AWW Only)
9. Upper Radiator Hose
10. Drain Plug
11. Radiator
12. Lower Radiator Hose
13. Oil Cooler
14. Thermostat Housing
15. Water Pump
16. Coolant Pipe

Fig. 18: A/C Pressure Switch -F129- And High Pressure Sensor -G65
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Disconnect electrical connection
- Remove switch/sensor -B-.
- Tightening torque 5 N.m (44 in. lb.)
- Replace O-ring seal -A- (10.8 mm; 1.8mm)



1. Expansion Tank
2. Turbocharger
3. Intake Manifold
4. Cylinder Head/Cylinder Block
5. Coolant Pipe
6. Connection
7. Heat Exchanger
8. Transmission Oil Cooler
9. Lower Coolant Pipe
10. Oil Cooler
11. Upper Radiator Hose
12. Radiator
13. Lower Radiator Hose
14. After-Run Water Pump
15. Thermostat Housing
16. Water Pump

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Fig. 19: Removing Switch/Sensor -B-
Courtesy of VOLKSWAGEN OF AMERICA, INC.

A/C REFRIGERANT SYSTEM, REPLACING COMPONENTS

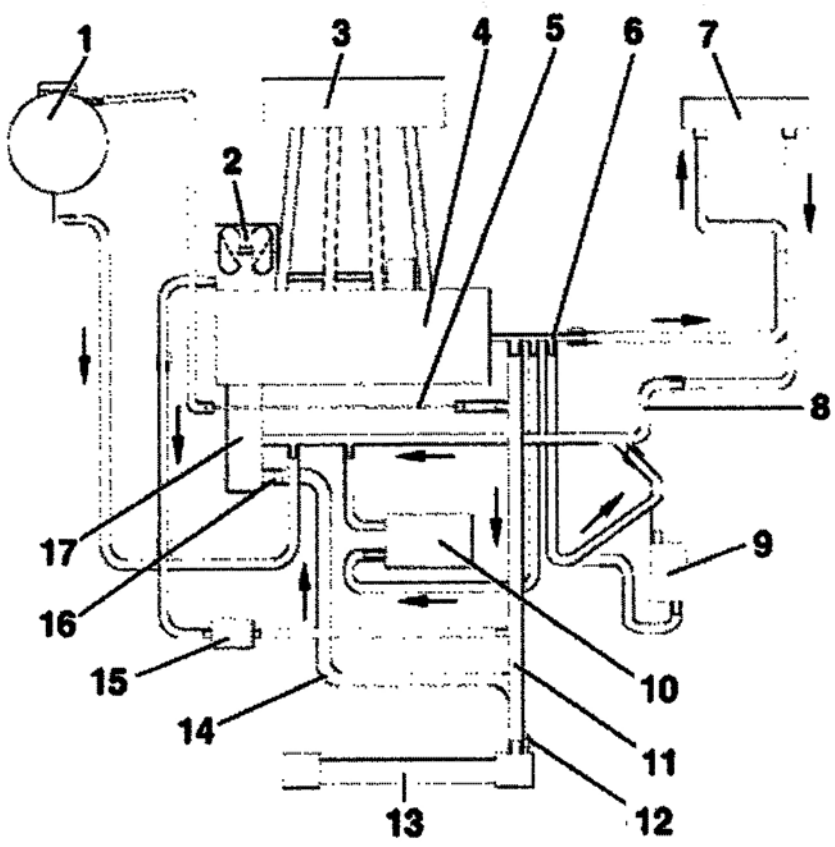
CAUTION: Before beginning repairs on the electrical system:

- **Obtain the anti-theft radio security code.**
- **Switch the ignition off.**
- **Disconnect the battery Ground (GND) strap.**
- **After reconnecting battery, re-code and check operation of anti-theft radio. Also check operation of clock and power windows according to Repair Manual and/or Owner's Manual.**
- **Immediately plug open connections on A/C components to prevent dirt and moisture contamination.**

NOTE:

- **Before carrying out any work on the A/C refrigerant system, refer to A/C refrigerant system safety measures, See A/C refrigerant system .**
- **Except where indicated with *, all system components illustrated must only be serviced or replaced after discharging refrigerant system.**

NOTE: During servicing, all couplings, fittings and related fasteners must be torqued to specifications.



1. Expansion Tank
2. Turbocharger
3. Intake Manifold
4. Cylinder Head/Cylinder Block
5. Upper Coolant Pipe
6. Connection
7. Heat Exchanger
8. Lower Coolant Pipe
9. ATF Cooler (Automatic Transmissions Only)
10. Oil Cooler
11. Upper Radiator Hose
12. Drain Plug
13. Radiator
14. Lower Radiator Hose
15. After-Run Water Pump
16. Thermostat Housing
17. Water Pump

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Fig. 20: Identifying A/C Refrigerant System Components
Courtesy of VOLKSWAGEN OF AMERICA, INC.

NOTE: The following list refers to items in Fig. 20 .

1. **Sealing plug**
   - 15 N.m (11 ft. lb)
2. **O-ring**
   - 10.8 mm; 1.8 mm
3. **Receiver drier**
4. **O-ring**
   - 10.8 mm; 1.8 mm
5. **Refrigerant pipe**
   - From receiver drier to expansion valve
6. **Bolt**
   - 15 N.m (11 ft. lb)
7. **A/C pressure switch -F129- (4-Pin) or high pressure sensor -G65- (3-Pin)**
   - Depending on engine type, refrigerant systems have either an A/C pressure switch -F129- or high pressure sensor -G65- installed. Refer to system wiring diagrams.
   - Checking -F129-, See **A/C pressure switch -F129-, checking** .
   - Checking -G65-, See **High pressure sensor -G65-**
   - Removing and installing, See **Removing And Installing A/C Pressure Switch -F129- And High Pressure Sensor -G65-**
   - Component can be removed without discharging refrigerant system
8. **O-ring**
   - 10.8 mm; 1.8 mm
9. **Refrigerant pipe**
10. **Threaded plate**
11. **O-ring**
    - 10.8 mm; 1.8 mm
12. **Expansion valve**
13. **Bolt**
    - 8 N.m (71 in lb)
14. **O-ring**
    - 14 mm; 1.8 mm
15. **High pressure service valve**
    - Only use Kent Moore ACR4 or equivalent
16. **Refrigerant pipe**
17. **Low pressure service valve**
    - Only use Kent Moore ACR4 or equivalent
18. **O-ring**
    - 7,6 mm; 1.8 mm
19. **Evaporator**

- In heater/evaporator unit
- Removing, See **Heater/evaporator unit, disassembly and assembly**

20. **O-ring**
    - 16.7 mm; 1.8 mm
21. **Insulation**
22. **O-ring**
    - 7,6 mm; 1,8 mm
23. **Bolt**
    - 8 N.m (71 in lb)
24. **Refrigerant hose**
    - From compressor to condenser
25. **Bolt**
    - 15 N.m (11 ft. lb)
26. **O-ring**
    - 10.8 mm; 1.8 mm
27. **Condenser**
    - Removing and installing, See **Condenser, removing and installing**
28. **Compressor**
    - Sanden SD7-V16
    - Removing and installing compressor bracket, See **Compressor bracket, removing and installing**
29. **O-ring**
    - 14.3 mm; 2.4 mm
30. **Bolt**
    - 20 N.m (15 ft. lb)
31. **O-ring**
    - 10.8 mm; 1.8 mm
32. **A/C clutch -N25-***
    - Sanden
    - Servicing, See **A/C clutch -N25-, servicing (Sanden)**
33. **Refrigerant hose**
34. **O-ring**
    - 10.8 mm; 1.8 mm
35. **Damper**

CONDENSER, REMOVING AND INSTALLING

First do the following:

- Discharge refrigerant system, See **A/C refrigerant system, discharging**
- Drain coolant

  See COOLING SYSTEM (MECHANICAL) under ENGINE.

- Disconnect refrigerant pipes at condenser

  CAUTION: Immediately plug open connections on A/C components to prevent dirt and moisture contamination.

- Bring front end assembly (lock carrier) into service position.

  See **LOCK CARRIER, MOVING TO SERVICE POSITION** .

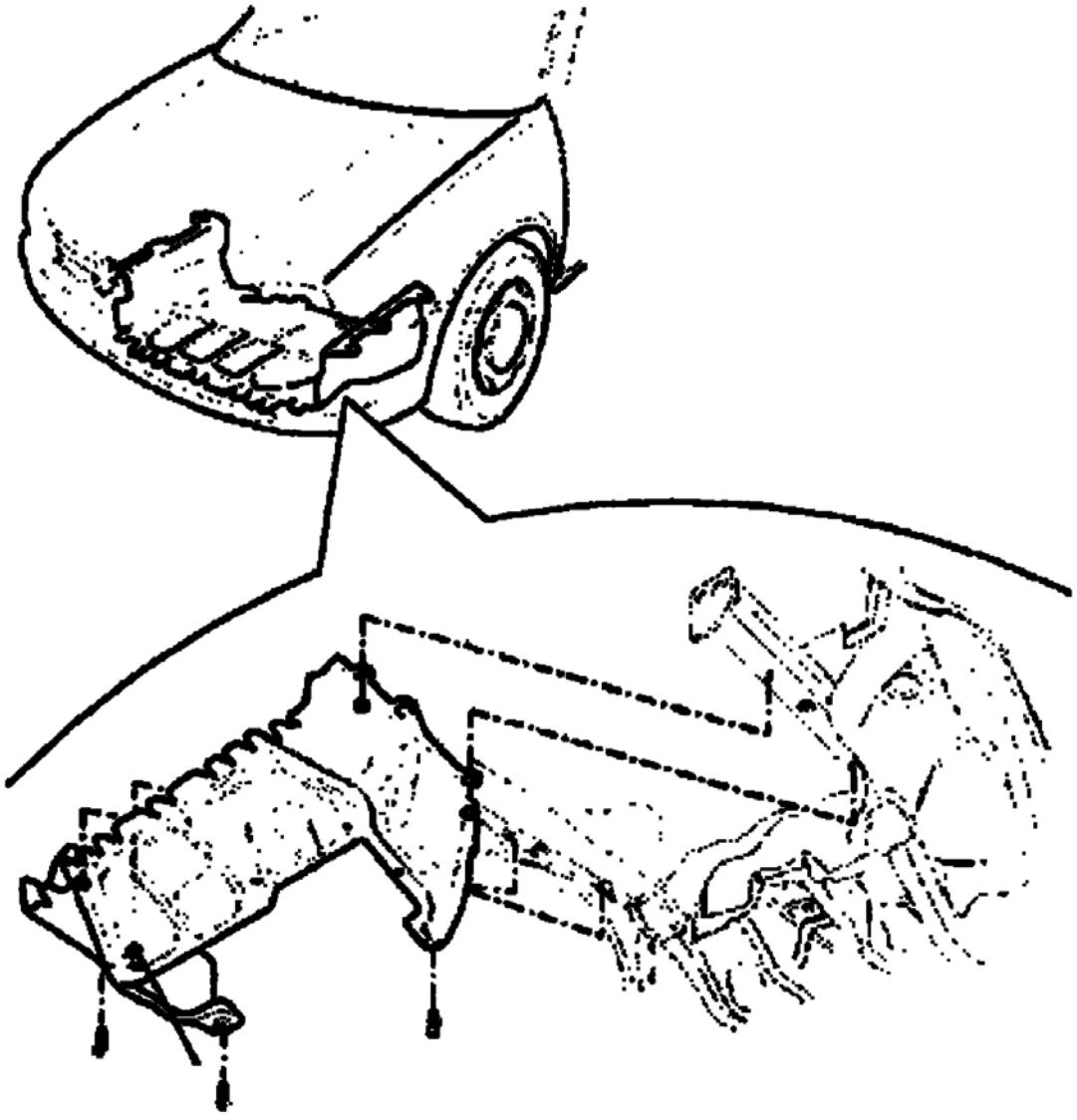

Fig. 21: Lock Carrier & Condenser
Courtesy of VOLKSWAGEN OF AMERICA, INC.

NOTE: The following list refers to items in Fig. 21 .

1. **Radiator**
    - Always use new coolant after replacement
2. **Condenser**
3. **Bolt**

- 8 N.m (71 in lb)

4. **Lock carrier**
   - Bring into service position

     See **LOCK CARRIER, MOVING TO SERVICE POSITION** .

HEATER/EVAPORATOR UNIT, DISASSEMBLY AND ASSEMBLY

Removing

First do the following:

- Discharge refrigerant system, See **A/C refrigerant system, discharging**
- Drain coolant

  See COOLING SYSTEM (MECHANICAL) under ENGINE.

- Disconnect refrigerant lines at condenser/expansion valve
- Disconnect coolant hoses from heater core

CAUTION:

- **Immediately plug open connections on A/C components to prevent dirt and moisture contamination.**
- **The cooling system is pressurized when the engine is warm. Wear gloves and other protection and carefully release system pressure if necessary, before performing repairs.**

- Remove instrument panel

  See **INSTRUMENT PANEL, REMOVING AND INSTALLING** .

- Loosen instrument panel cross member. See **INSTRUMENT PANEL CROSS MEMBER** .
- Remove heater/evaporator unit

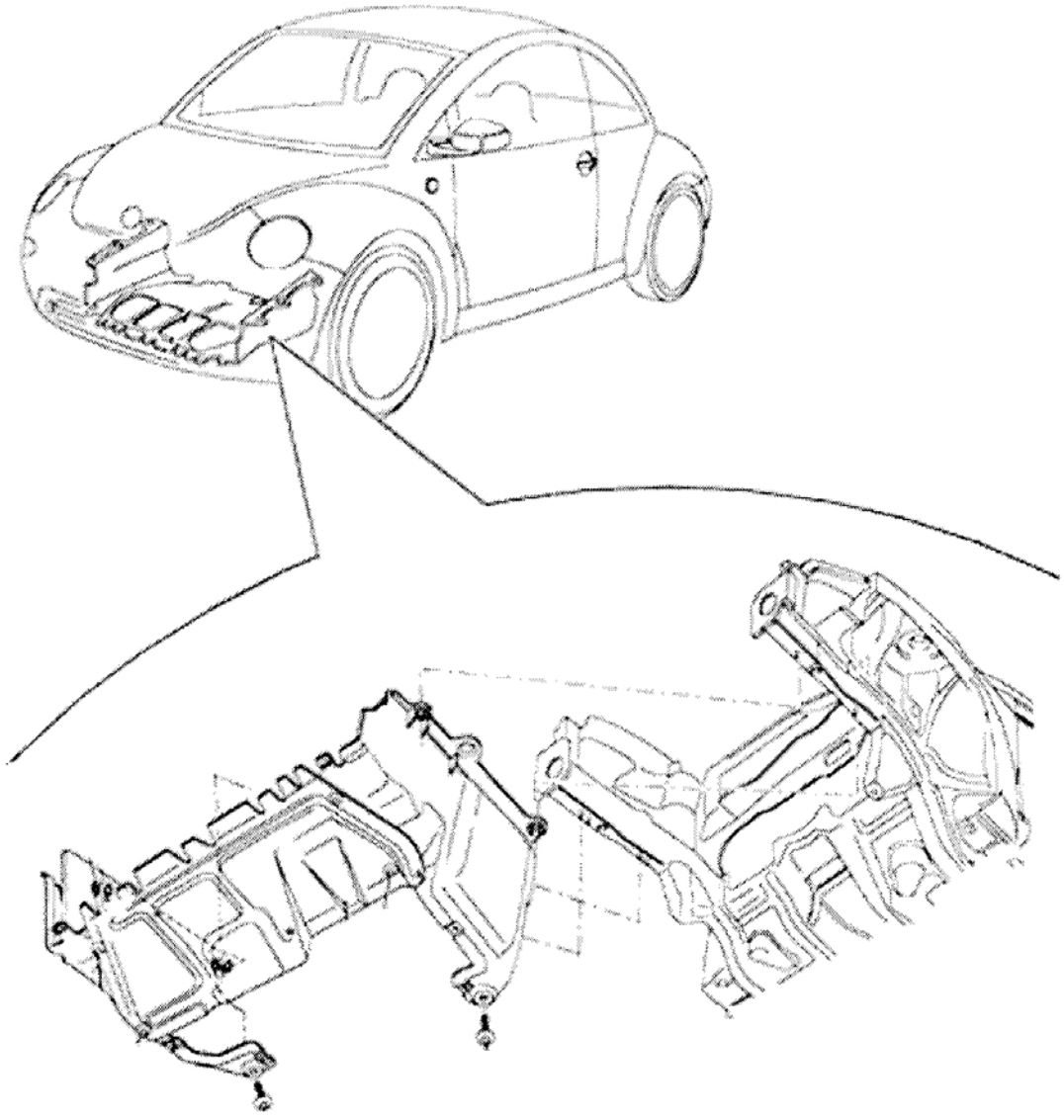

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Fig. 22: Exploded View Of Heater/Evaporator Unit
Courtesy of VOLKSWAGEN OF AMERICA, INC.

NOTE: The following list refers to items in Fig. 22 .

1. **Heater core**
   - Always use new coolant after replacement
2. **Housing, upper part**
   - With fresh/recirculating air flap
3. **Evaporator seal**

- Installing, See **Fig. 23** .

4. **Evaporator**
5. **Housing, lower part**

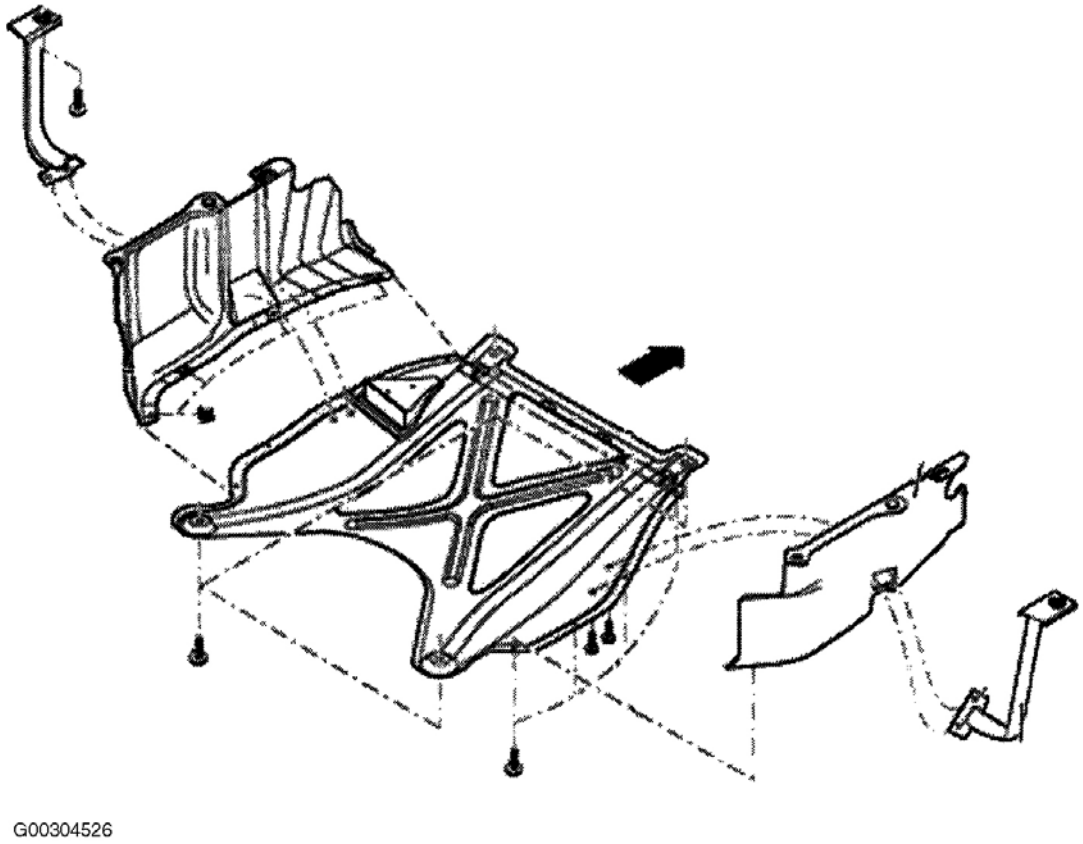

Fig. 23: Installing Evaporator Seal
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Glue seal -B- evenly to top and sides of the evaporator -A-.

NOTE: Evaporator water (condensation) must be able to drain from housing. Evaporator seal must NOT be installed on the bottom of the evaporator (see detail).

A/C REFRIGERANT SYSTEM PRESSURES AND TEMPERATURES, CHECKING

The pressures and temperatures in the A/C system will vary depending on engine speed (RPM), coolant fan speed, engine coolant temperature, A/C clutch engagement, outside temperature, humidity, etc.

Pressure and temperature specifications are based on the following:

- Engine speed (RPM) at 1500
- Fresh air blower on high speed
- A/C adjusted to Max. cooling

Pressure and temperature specifications, See **Pressure and temperature specifications** .

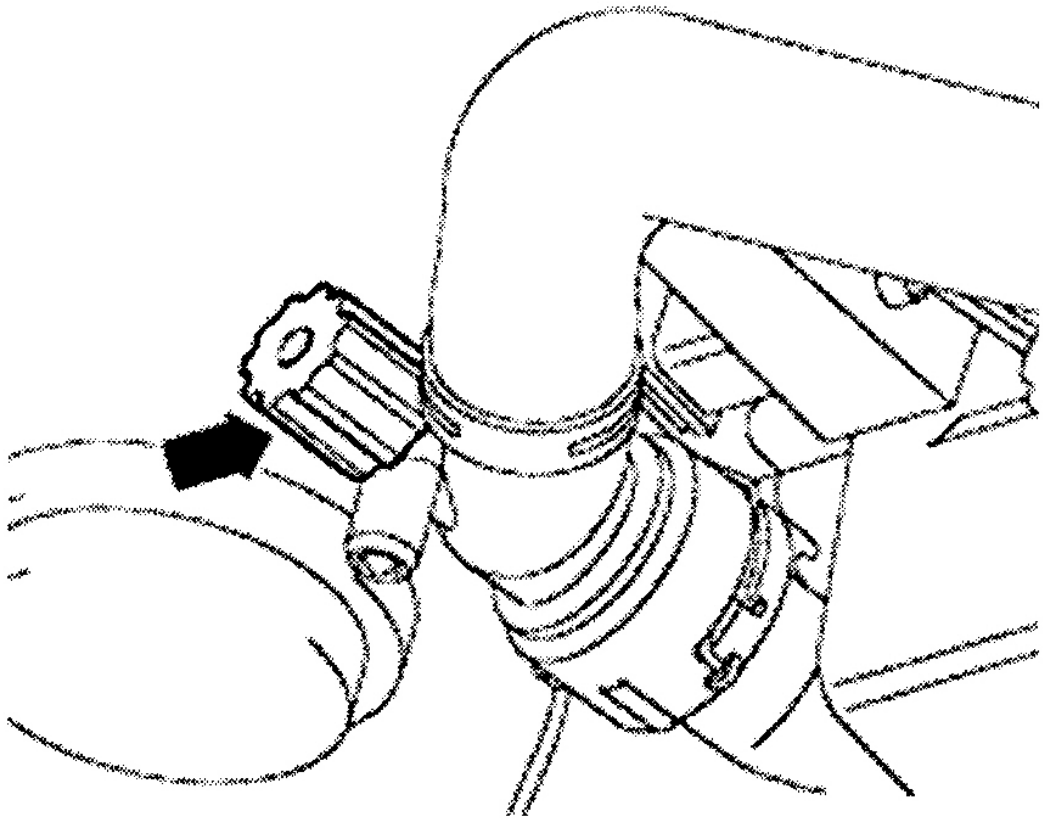

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Fig. 24: A/C Refrigerant System
Courtesy of VOLKSWAGEN OF AMERICA, INC.

NOTE: The following list refers to items in Fig. 24 .

1. **Evaporator**
2. **Low pressure service valve**
3. **Compressor, low pressure side**
4. **Compressor, high pressure side**

5. **Condenser**
6. **Receiver drier**
7. **Sight glass**
    - If equipped
8. **High pressure service valve**
9. **Expansion valve**

Pressure and temperature specifications

- Refer to **A/C refrigerant system pressures and temperatures, checking** and **A/C refrigerant system, component overview** for component identification.

PRESSURE AND TEMPERATURE SPECIFICATIONS

Component	Refrigerant state	Approximate pressure (bar/psi)	Approximate temperature
1 - Evaporator, inlet to outlet	Vapor to Gas		-7°C (19°F)(2)
2 - Low pressure service valve	Gas	1.2 bar (17.4 psi)(1)	-1°C (30°F)
3 - Compressor, low pressure side			Gas
4 - Compressor, high pressure side	Gas		65°C (149°F)
5 - Condenser	Gas		
5 - Condenser	to Vapor		55°C (131°F) at outlet
5 - Condenser	to Liquid	14bar (203psi)	
6 - Receiver drier	Liquid		
7 - Sight glass (if equipped)	Liquid		55°C (131°F)
8 - High pressure service valve	Liquid		
9 - Expansion valve	Liquid to Vapor	Inlet: 14 bar (203 psi) Outlet: 1.2 bar (17.4 psi)	Inlet: 55°C (131°F) Outlet: -7°C (19°F)

(1) Pressure maintained in the refrigerant system by the variable displacement compressor despite variables in temperature, load and engine speeds (RPM).

(2) Temperature maintained in the refrigerant system by the variable displacement compressor despite variables in temperature, load and engine speeds (RPM).

A/C REFRIGERANT SYSTEM, TESTING WITH PRESSURE GAUGES

Due to the constant temperature/pressure relationship of refrigerant R-134a, approximate high-side system temperature can be determined based on system pressure.

Pressure gauges may have one or more temperature scales in addition to the pressure scale. Since various

refrigerants have different temperature/pressure relationships, each gauge is specific for a particular refrigerant.

Measuring pressure and temperature in a "switched-on" refrigerant system

Use the A/C refrigerant high-pressure gauge to measure high pressure between the compressor and restrictor (including condenser) with the A/C switched on.

Use the A/C refrigerant low-pressure gauge to measure low pressure between the restrictor and the compressor inlet (including evaporator) with the A/C switched on.

The temperature displays of the low- and high-pressure gauges apply only to a portion of the low- and high-pressure sides. The low-pressure gauge displays approximate temperature between the restrictor and evaporator outlet. The high-pressure gauge displays approximate temperature between the compressor outlet and restrictor.

NOTE: The temperature/pressure relationship only holds true when the refrigerant system contains liquid and vapor, but not when it contains only gas. In the gaseous state, the temperature is approx. 10-30°C (18-54°F) higher than indicated on the pressure gauge.

Measuring pressure and temperature in a closed container or "switched-off" refrigerant system

Due to the constant temperature/pressure relationship of R-12 and R-134a, approximate temperature in a closed container or in a switched-off A/C system can be determined based on its pressure.

If the temperature displayed on a gauge is lower than the actual temperature of the refrigerant, the refrigerant container or system is empty (discharged).

NOTE: The temperature/pressure relationship only holds true when the refrigerant system contains liquid and vapor, but not when it contains only gas. In the gaseous state, the temperature is approx. 10-30°C (18-54°F) higher than indicated on the pressure gauge.

A/C REFRIGERANT SYSTEM, DISCHARGING

WARNING:

- **Always use an Underwriter's Laboratory (UL) approved refrigerant recovery/recycling/recharging unit such as Kent-Moore ACR^4 , or equivalent, whenever discharging an R-134a A/C system.**
- **Any person who services a motor vehicle air conditioner MUST, by law, be properly trained and certified and use approved refrigerant recycling equipment. Technicians must complete an EPA approved recycling course to be certified.**
- **State and local governments may have additional requirements regarding air conditioning servicing. Always comply with state and local laws.**
- **Always wear safety goggles when charging or discharging system.**

CAUTION:

- **Always use separate refrigerant recovery/recycling/recharging servicing equipment for R-12 and R-134a systems. DO NOT use one piece of equipment for both R-12 and R-134a systems. The residual traces of refrigerant inside the equipment will contaminate and damage the equipment. Servicing equipment includes recovery/recycling/recharging unit, charging station, vacuum pump, manifold gauges, etc.**
- **DO NOT use R-12 servicing equipment on R-134a systems or R-134a equipment on R-12 systems or damage to both the vehicle A/C system and servicing equipment may result. Use only equipment designed to meet Society of Automotive Engineers (SAE) standards.**
- **R-134a and R-12 systems use different size service fittings. NEVER use adaptors to convert an R-12 fitting to R-134a size or R-134a fitting to R-12 size.**

NOTE: **Refer to safety measures starting on A/C refrigerant system prior to discharging or charging A/C refrigerant system.**

Discharging The A/C System

NOTE: **Make sure that initial set-up of the refrigerant recovery/recycling/recharging unit has been completed before discharging the A/C system.**

- Connect red high-pressure hose -A- of refrigerant recovery/recycling/recharging unit to high side fitting on vehicle and open coupler valve. See **Fig. 25** .
- Connect blue low-pressure hose -B- of refrigerant recovery/recycling/recharging unit to low side fitting on vehicle and open coupler valve.

CAUTION: Always follow manufacturer's instructions when using a refrigerant recovery/recycling/recharging unit.

- Following refrigerant recovery/recycling/recharging unit manufacturer's instructions, discharge A/C system into refrigerant recovery/recycling/recharging unit.
- Disconnect power supply from A/C clutch to prevent accidental compressor operation with A/C system discharged.

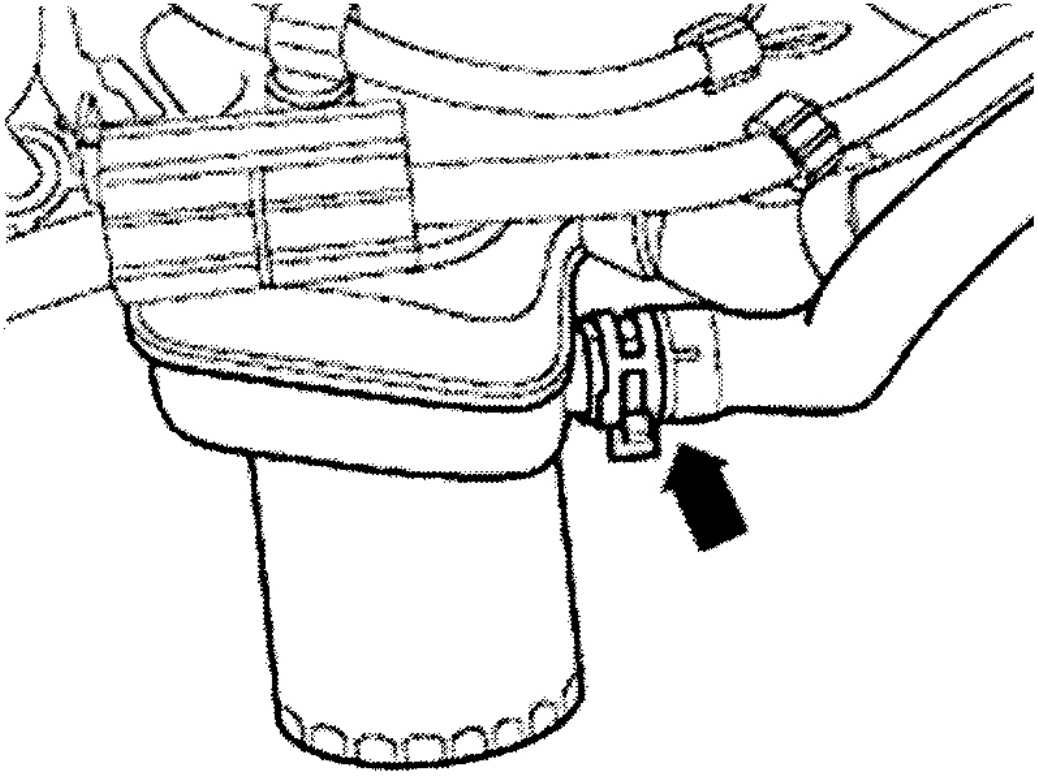

Fig. 25: Identifying Refrigerant Recovery/Recycling/Recharging Unit
Courtesy of VOLKSWAGEN OF AMERICA, INC.

A/C REFRIGERANT SYSTEM, FLUSHING WITH COMPRESSED AIR AND NITROGEN

CAUTION:

- **When using compressed nitrogen always use a pressure regulator and the proper adaptor hoses and fittings (available locally). During flushing, use existing exhaust/ventilation systems to draw off the gas mixture escaping from the A/C system.**
- **DO NOT flush R-134a refrigerant system with R-11. R-11 is not compatible with R-134a refrigerant and PAG oil and will cause total system contamination.**

- Use compressed air and nitrogen (available locally) to remove moisture, impurities and old refrigerant oil from A/C refrigerant system.
- First blow out old refrigerant oil and dirt with compressed air, then dry components with nitrogen.
- DO NOT blow compressed air and nitrogen through the compressor or expansion valve. Only blow

compressed air and nitrogen through disconnected, free flowing components (i.e. disconnected hose, condenser, evaporator, etc.)

- DO NOT blow compressed air and nitrogen into a capped off A/C component. Pressurized R-134a refrigerant in the presence of oxygen may form a combustible mixture.
- Always flush components in opposite direction of refrigerant flow.
- Flush evaporator through the low-pressure line with the high-pressure line removed.
- If any component has dark thick deposits that cannot be removed with compressed air, replace component.
- Thin light gray deposits in refrigerant lines and hoses are normal and do not impair the function of the system.
- Always replace receiver drier and restrictor after flushing.
- Dispose of contaminated refrigerant (PAG) oil following laws governing hazardous waste disposal. Do not combine PAG oil with any other old oils such as engine oil or transmission fluid.

Flush refrigerant system with compressed air and nitrogen if:

- Refrigerant oil is dark and viscous (thick)
- Too much refrigerant oil is in the system following compressor replacement
- Unclear or do not know how much refrigerant oil is in the system
- Moisture, dirt or other impurities have entered the refrigerant system (i.e. following an accident)
- Unable to pull a constant vacuum during evacuation of a leak-free system due to excessive moisture in the system
- Refrigerant system has been open longer than the time required for normal repairs (i.e. following an accident)
- Based on temperature and pressure measurements, system is diagnosed with moisture contamination
- Compressor is replaced due to noises or internal damage
- Flushing is required after replacing certain components in certain situations, See **A/C refrigerant system, replacing components** .

A/C REFRIGERANT SYSTEM, EVACUATING AND RECHARGING

WARNING:

- **Always use an Underwriter's Laboratory (UL) approved refrigerant recovery/ recycling/recharging unit such as Kent-Moore ACR^4 , or equivalent, when evacuating and recharging an R-134a A/C system.**
- **Any person who services a motor vehicle air conditioner MUST, by law, be properly trained and certified and use approved refrigerant recycling equipment. Technicians must complete an EPA approved recycling course to be certified.**
- **State and local governments may have additional requirements regarding air conditioning servicing. Always comply with state and local laws.**

- **Always wear safety goggles when discharging, evacuating and recharging an A/C system.**

CAUTION: Always follow manufacturer's instructions when using a refrigerant recovery/recycling/recharging unit.

NOTE:

- **Refer to R-134a safety measures prior to discharging or charging A/C refrigerant system, See A/C refrigerant system .**
- **Follow refrigerant recovery/recycling/recharging unit manufacturer's instructions for evacuating and recharging A/C system.**
- **Evacuate refrigerant system for a minimum of 30 minutes.**
- **When recharging A/C system, add correct amount of refrigerant and PAG oil to system. See A/C refrigerant system, capacities .**
- **After system recharge, manually rotate A/C compressor approx. 10 turns before starting engine. Start engine with A/C OFF. After idle speed has stabilized, switch A/C ON and let engine idle (compressor running) for a minimum of two minutes before raising engine speed.**

A/C REFRIGERANT SYSTEM, TROUBLESHOOTING

REQUIREMENTS

- Electrical systems OK
- Air flow distribution systems (controls and cables) OK

Correct and repair as necessary before proceeding.

If any one of the following system conditions exists, check A/C refrigerant system pressures. See **A/C refrigerant system pressures, checking** .

- A/C does not cool (cooling has stopped completely)
- Insufficient cooling during all driving speeds or engine speeds (RPM)
- No cooling or insufficient cooling after a period of driving

COMPRESSOR NOISY

- Tighten compressor and compressor bracket mounting bolts using torque wrench.
- Check routing of A/C refrigerant hoses and lines; hoses and lines must not contact other components and must be installed without tension or kinks, reposition or realign as necessary.

A/C compressor noisy immediately after switching A/C ON and/or when driving around corners or braking (refrigerant shock) - system overcharged

- Discharge A/C refrigerant system. See **A/C refrigerant system, discharging** . Then evacuate and recharge. See **A/C refrigerant system, evacuating and recharging** .

WITH AN OTHERWISE PROPERLY OPERATING A/C SYSTEM, WATER SPRAYS OUT OF INSTRUMENT PANEL VENTS

- Check evaporator drain pipe for proper routing (should not be kinked or pinched).
- Check evaporator water drain valve.
  - Must not be plugged with wax, dirt or undercoating (clean if necessary)
  - Valve flap must open/close properly
- Check plenum tray.
  - Must be properly installed and not damaged

A/C REFRIGERANT SYSTEM PRESSURES, CHECKING

Check A/C refrigerant system pressures using these three tests:

1. Air temperature drop from center instrument panel outlet (A/C system cooling performance)
2. A/C system high pressure
3. A/C system low pressure

The combined results of all three steps determine which part of the A/C system is causing the problem. See **SPECIFIED RESULT CHART** .

Test conditions

- A/C refrigerant system fully charged; discharge, evacuate and recharge system if necessary
- Condenser and radiator clean and free of obstructions (spray clean if necessary)
- Air distribution can be adjusted correctly using control knobs (all air distribution flaps reach end positions)
- Wiring OK per wiring diagram
- Outside (ambient) air temperature between 20-30°C (68-86°F)
- Drive belts for A/C compressor and Generator in good condition and properly tensioned

Test 1: Air temperature drop from center instrument panel outlet, checking (A/C system cooling performance)

- Start engine.
- Set temperature control to maximum "cold".
- Press "A/C" button and select second blower speed.
- Adjust air distribution to instrument panel outlets.
- Insert thermometer into center instrument panel outlet and raise engine speed to approximately 1500 RPM.

Specified result

With humidity normal and outside (ambient) temperature between 20-25°C (68-77°F), system is cooling satisfactorily if air temperature from center instrument panel vent drops below 10°C (50°F) within 1 minute.

For higher ambient temperatures and/or higher humidity, specified air temperature from center instrument panel vent can be slightly higher.

If specified reading is not obtained, perform tests 2 and 3, then compare results of all three tests. See **SPECIFIED RESULT CHART** .

Test 2: A/C system high pressure, checking

- Connect high- and low-pressure hoses of refrigerant recovery/ recycling/recharging unit Kent-Moore ACR^4 or equivalent, to high- and low-pressure service valves.
- Disconnect electrical connector from coolant fan.
- Start engine.
- Set temperature control to maximum "hot".
- Press "A/C" button and select highest blower speed.
- Adjust air distribution to footwell outlets.
- Raise engine speed to approximately 1500 RPM.

Specified result

System high pressure is normal if high-pressure gauge reads 232 psi (16 bar) within 30 seconds.

If specified reading is not obtained, also perform test 3 and compare results of all three tests. See **SPECIFIED RESULT CHART** .

Test 3: A/C system low pressure, checking

- Connect high- and low-pressure hoses of refrigerant recovery/recycling/recharging unit Kent-Moore ACR^4 , or equivalent, to high- and low-pressure service valves.
- Start engine.
- Set temperature control to maximum "cold".
- Press "A/C" button and select first blower speed.
- Adjust air distribution to instrument panel outlets.
- Raise engine speed to 1500 RPM.

Specified result

System low pressure is normal if low-pressure gauge reads 22-36 psi (1.5-2.5 bar) within 30 seconds.

If specified reading is not obtained, compare results of all three tests. See **SPECIFIED RESULT CHART** .

Specified Result Chart

SPECIFIED RESULT CHART

Test 1 Temperature from center air vent(1)	Test 2 High pressure(2)	Test 3 Low pressure(1)	Possible causes of incorrect readings	Corrective measures
Normal	Normal	Normal	None	-
Too high	Normal	Normal	Temperature flap position incorrect	Adjust temperature flap cable
Too high	Too low	Normal	Compressor	Replace compressor
Normal	Too low	Normal	Compressor	Replace compressor
Normal	Normal	Too high or too low		
Too high	Normal	Too high or too low	Expansion valve or compressor	Clean/replace expansion valve or replace compressor
Normal	Too high or too low	Too high or too low		

(1) Normal air outlet temperature approx. 6°C (43°F). For higher ambient temperatures and/or higher humidity, specified air temperature from center instrument panel vent can be slightly higher.

(2) For normal system temperatures and pressures, See **Pressure and temperature specifications** .

A/C REFRIGERANT SYSTEM COOLING PERFORMANCE, CHECKING

NOTE: A/C evaporator temperature switch -E33- (if equipped) switches A/C compressor OFF only in special instances so evaporator does not ice up; variable displacement A/C compressor maintains temperature of 0°C (32°F) in evaporator.

Test conditions

- A/C refrigerant system fully charged
- A/C clutch -N25- and compressor function OK
- Condenser and radiator clean and free of obstructions
- Air distribution can be adjusted properly
- Wiring OK as per wiring diagram
- Outside (ambient) temperature 20°C-30°C (68°F-86°F)

Checking

- Start engine.
- Set temperature control to maximum "cold".
- Press A/C button and select second blower speed.

- Adjust air distribution to instrument panel outlets.
- Insert thermometer into center instrument panel outlet.
- Raise engine speed to approximately 1500 RPM.

Specified result

With normal humidity and outside (ambient) temperature between 20°-25°C (68°-77°F), system is sufficiently charged if air temperature from center instrument panel vent drops below 10°C (50°F) within one minute.

For higher ambient temperatures and/or higher humidity, specified air temperature from center instrument panel vent can be slightly higher.

A/C REFRIGERANT SYSTEM, CHECKING FOR LEAKS

Use halogen leak detector, Hitec HI400A-TEL or equivalent, to check for refrigerant leaks, following the leak detector manufacturer's instructions.

Refrigerant gas dissipates very quickly. To make the job easier, avoid drafty or windy areas when checking for leaks.

If the refrigerant system is discharged (empty), recharge the system with approx. 100 g (3.5 oz.) of refrigerant in order to check for leaks.

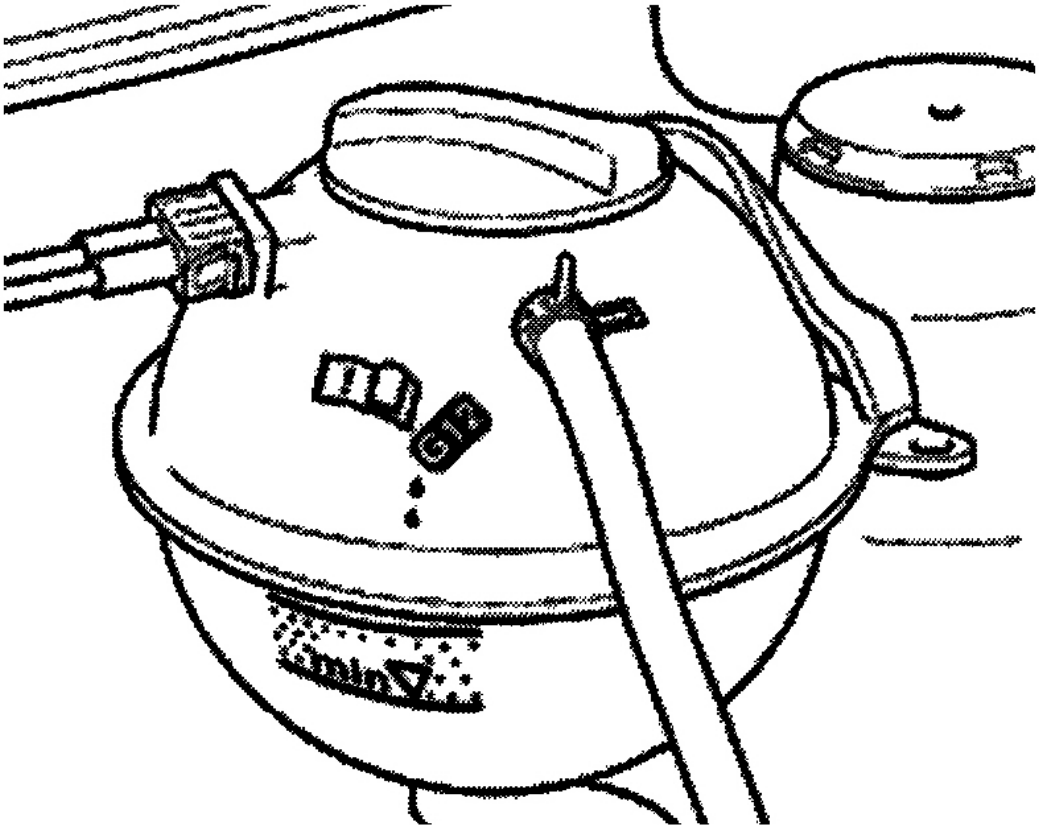

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Fig. 26: Checking A/C Refrigerant System For Leaks
Courtesy of VOLKSWAGEN OF AMERICA, INC.

A/C REFRIGERANT SYSTEM, CAPACITIES

REFRIGERANT R-134A, CAPACITY

REFRIGERANT R-134a CAPACITY

Model	Quantity
New Beetle	700 g +/- 50 g (24.7 oz +/- 1.8 oz)

Obtain R-134a refrigerant from a local A/C supplier under one of the following names:

- R-134a
- Tetrafluoroethane

- CH_2 F CF_3
- H-FKW 134a
- SUVA(R) TRANS A/C
- ARCTON(R) 134a

NOTE: R-134a refrigerant is packaged in different containers. Some are used only for commercial applications which are sold in cylinders using a 1/4" flare fitting. This does not connect to the vehicle fittings and servicing equipment. Use only R-134a which come in containers having the correct type of service fitting.

REFRIGERANT (PAG) OIL R-134A, CAPACITY

REFRIGERANT OIL R-134A, CAPACITY

Model	Total system capacity
New Beetle	135 cc (4.6fl. oz.)

Replacement A/C compressors supplied by the Parts Department are filled with 135 cc (fl. oz.) of refrigerant oil. This is the total A/C system refrigerant oil capacity.

REFRIGERANT (PAG) OIL R-134A, DISTRIBUTION

The total refrigerant oil quantity is distributed in the refrigerant circuit as follows:

Compressor approx.50%

Compressor approx. 10%

Suction pipe approx. 10%

Discharge pipe - (Not available)

Evaporator approx. 20%

Receiver drier approx. 10%

NOTE: When replacing refrigerant circuit components, fill an appropriate amount of refrigerant oil (as indicated above) into the new part before installation.

REFRIGERANT (PAG) OIL R-134A, IDENTIFICATION

Use only the correct type of refrigerant oil (PAG oil) specified for use with R-134a and compressor type.

REFRIGERANT OIL R-134A, IDENTIFICATION

Compressor	Refrigerant oil Part No.

CAUTION: Part numbers are for reference only. Always check with for Parts Department for latest parts information.

HEATING AND A/C CONTROLS/MECHANICAL COMPONENTS, SERVICING

COMPONENTS IN PASSENGER COMPARTMENT, SERVICING

CAUTION: Before beginning repairs on the electrical system:

- **Obtain the anti-theft radio security code.**
- **Switch the ignition off.**
- **Disconnect the battery Ground (GND) strap.**
- **After reconnecting battery, re-code and check operation of anti-theft radio. Also check operation of clock and power windows according to service information and/or Owner's Manual.**
- **Immediately plug open connections on A/C components to prevent dirt and moisture contamination.**

NOTE:

- **Before carrying out any work on the A/C refrigerant system, refer to A/C refrigerant system safety measures, See A/C refrigerant system .**
- **System components identified with an * must only be serviced or replaced after discharging refrigerant system. Use Kent Moore ACR4 or equivalent.**

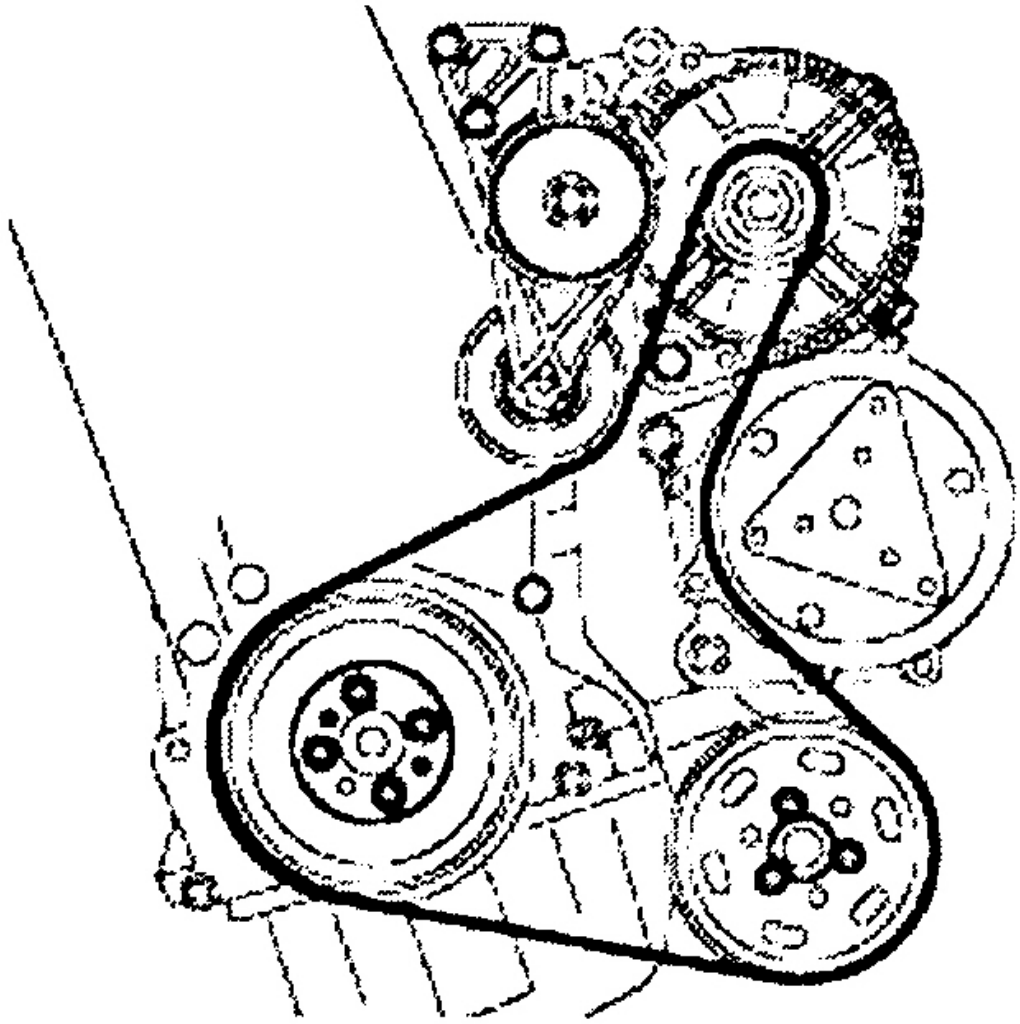

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Fig. 27: Heating And A/C Controls/Mechanical Components (Passenger Compartment)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

NOTE: The following list refers to items in Fig. 27 .

1. **Heating and A/C controls**
   - With A/C switch -E35-
   - With fresh air blower switch -E9-
   - With switch for fresh air blower and recirculated air -E184-

- Removing and installing, See **Heating and A/C controls, removing and installing** .
- Assembly, See **Heating and A/C controls, assembly** .

2. **Dust and pollen filter**
   - Removing and installing, See **DUST AND POLLEN FILTER, REMOVING AND INSTALLING** .
3. **Side window air outlet**
   - Removing, See **SIDE WINDOW AIR OUTLETS, REMOVING** .
4. **Side air outlets**
   - Removing, See **SIDE WINDOW AIR OUTLETS, REMOVING**
5. **Center air outlet console**
   - Removing, See **CENTER AIR OUTLET CONSOLE, REMOVING**
6. **Instrument panel cross member**
   - Loosening and tightening, See **INSTRUMENT PANEL CROSS MEMBER**
7. **Servo motor for fresh/recirculating air door -V154-**
   - Removing and installing, See **SERVO MOTOR FOR FRESH/RECIRCULATING AIR DOOR -V154-, REMOVING AND INSTALLING**
8. **Fresh air blower -V2-**
   - Removing, See **FRESH AIR BLOWER REMOVING**
9. **Fresh air blower series resistance with fuse -N24-**
   - Removing, See **FRESH AIR BLOWER REMOVING**
10. **Intermediate duct**
11. **Cables**
    - Installing and adjusting, See **HEATING AND VENTILATION CABLES, INSTALLING AND ADJUSTING**
12. **Rear footwell duct**
13. **Gasket**
14. **Connecting duct**
    - With front footwell air outlet
    - Removing, See **CONNECTING DUCT, REMOVING**
15. **Heater/evaporator unit***
    - Disassembly and assembly, See **Heater/evaporator unit, disassembly and assembly**
16. **Heater core***
    - Removing, See **Heater/evaporator unit, disassembly and assembly**
    - Always use new coolant after replacement
17. **Heater core/bulkhead seal**
    - Note installation position, See **HEATING AND VENTILATION UNIT, ASSEMBLY**
18. **Defroster duct**
    - Replacing:

- Remove instrument panel

  See **INSTRUMENT PANEL, REMOVING AND INSTALLING**

- Loosen instrument panel cross member, See **INSTRUMENT PANEL CROSS MEMBER**

19. **Instrument panel**
    - Removing and installing

      See **INSTRUMENT PANEL, REMOVING AND INSTALLING**

20. **Center air outlet duct**
21. **Defroster air outlet panel**
    - Removing, See **SIDE WINDOW AIR OUTLETS, REMOVING**

HEATING AND A/C CONTROLS, REMOVING AND INSTALLING

Removing

- Remove center air outlet console, See **CENTER AIR OUTLET CONSOLE, REMOVING**
- Remove mounting screws -arrows-.

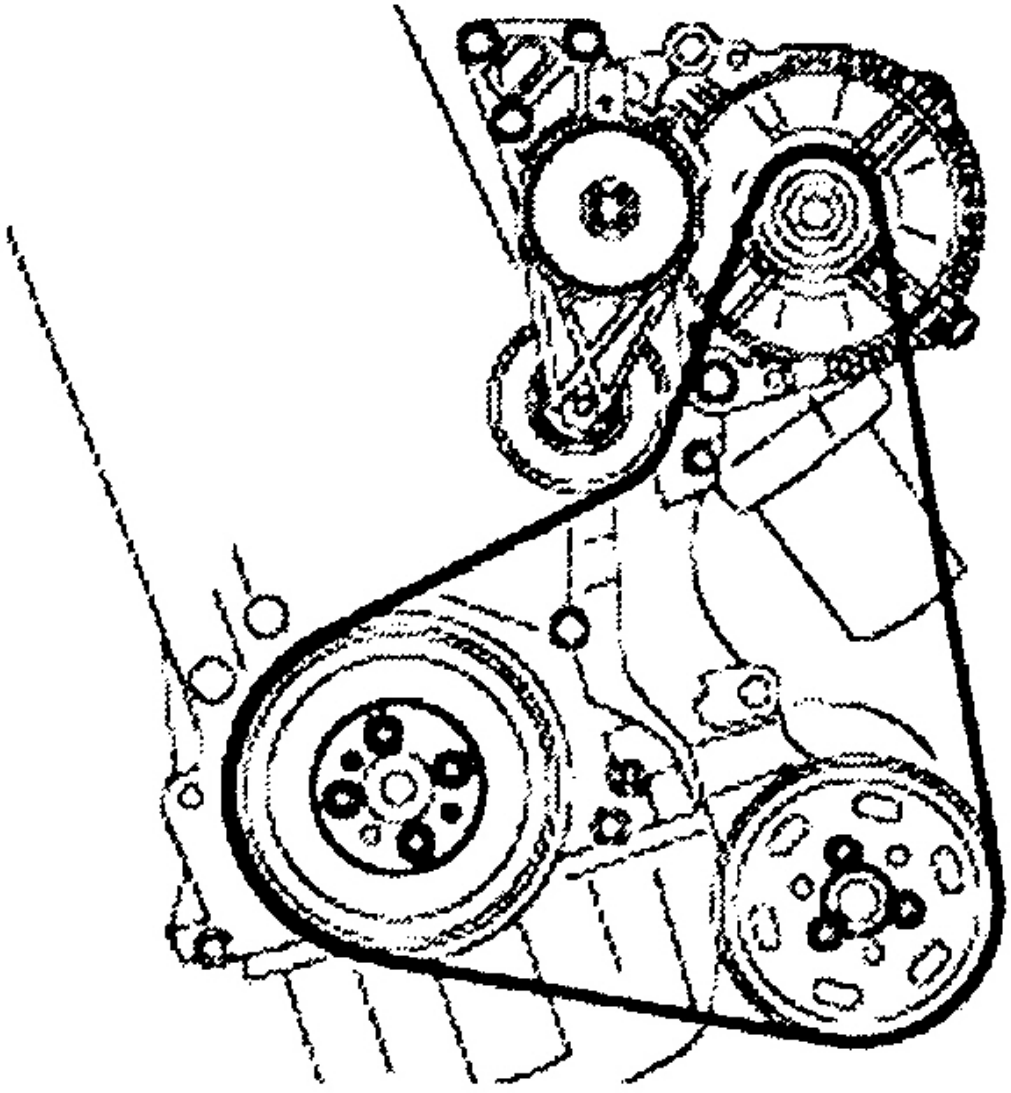

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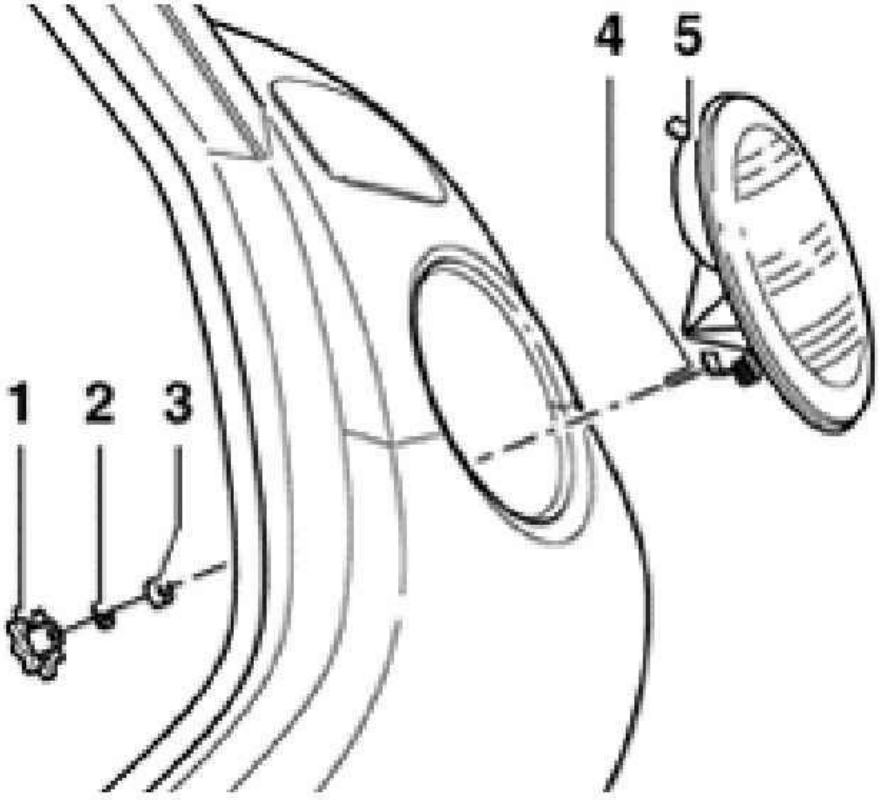
Fig. 28: Removing Heating And A/C Controls Mounting Screws
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Lift out controls with cables from instrument panel in direction of -arrow A-.
- Detach cables from controls.
- Disconnect electrical connector.

With controls removed, check function of heating and ventilation cables as follows:

- Move cables in and out several times -arrow-.
- Replace damaged or stiff cables.



1 - Knurled nut

2 - Washer

3 - Spacer

4 - Retaining bolt

5 - Rear light

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Fig. 29: Moving Heating And A/C Cables In And Out Several Times
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Installing

NOTE:

- **Cable sleeves are color coded.**
- **All flaps must audibly move onto stops when turning controls.**
- **Always check cables before installing. Replace tight or damaged cables.**

- Attach cable -1- to actuating arm -2- as indicated-arrow-.

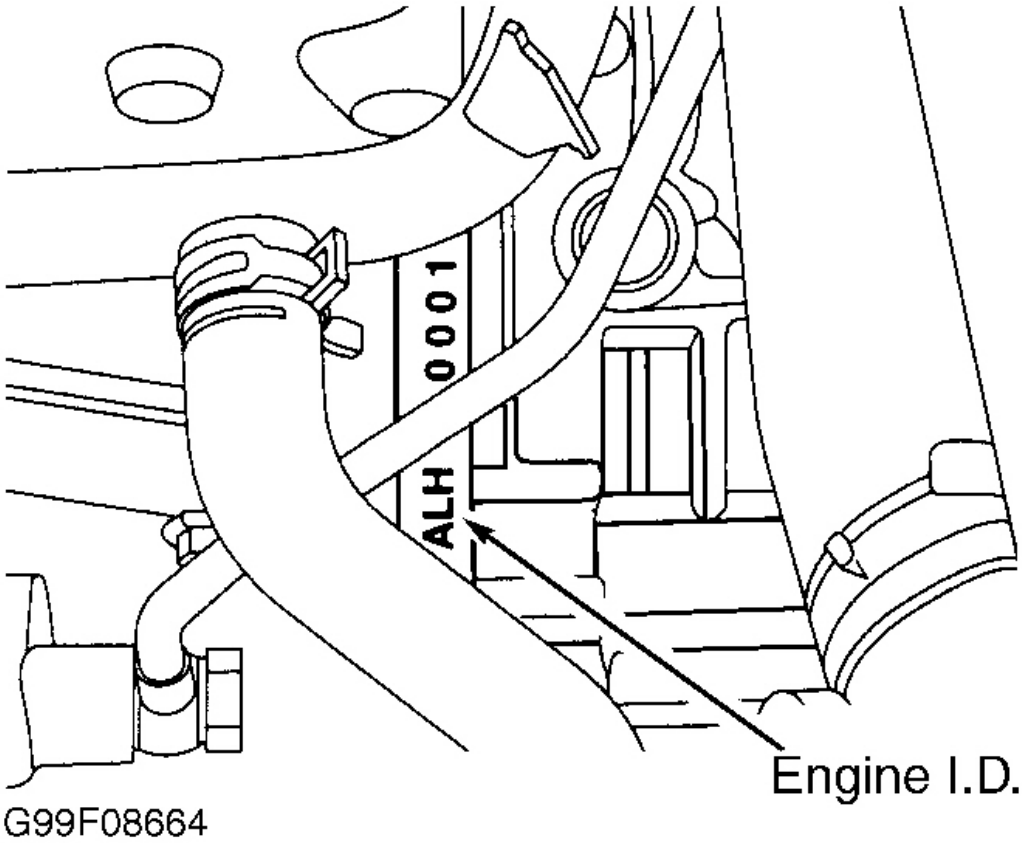
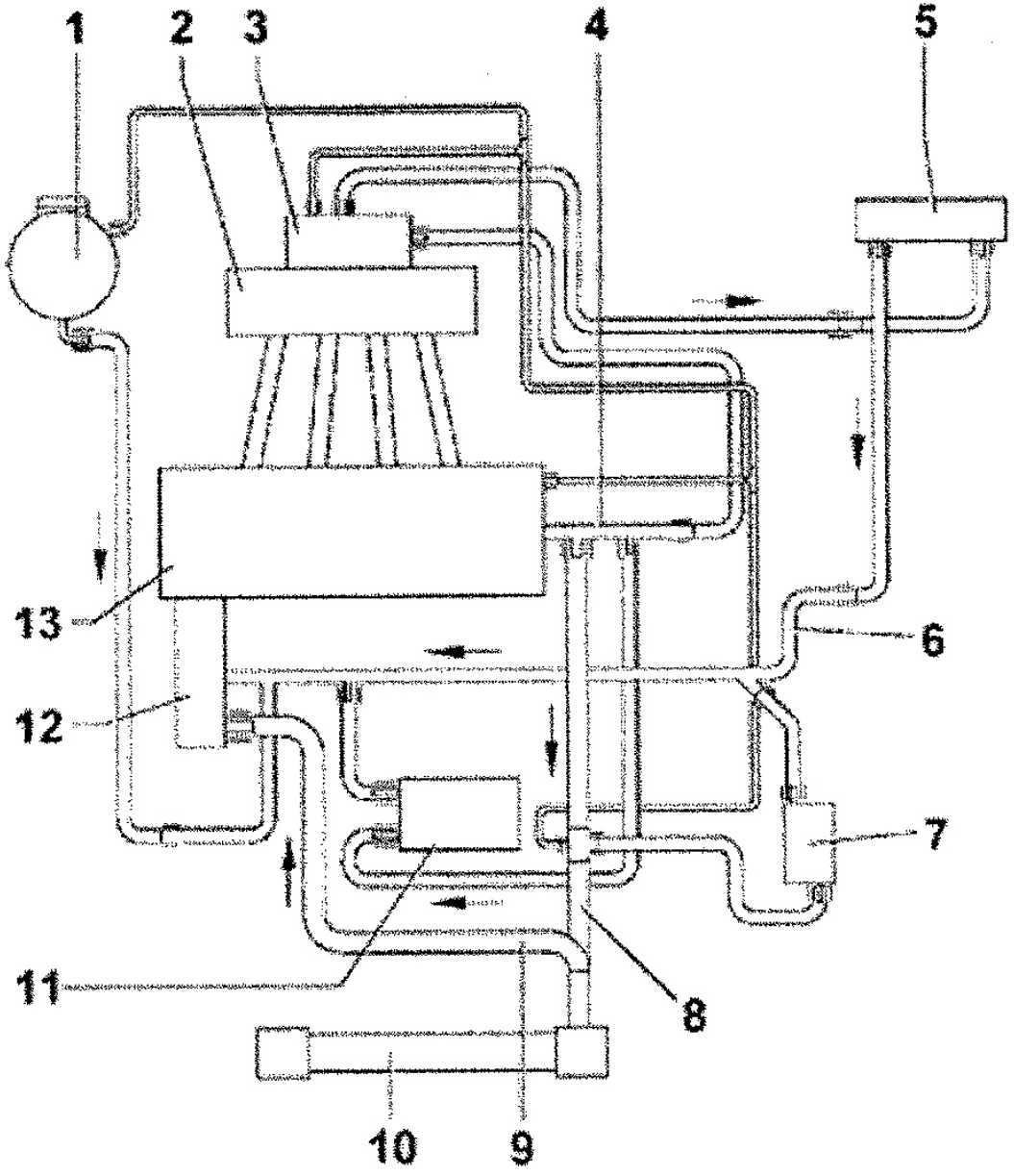


Fig. 30: Attaching Cable To Actuating Arm
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Press cable for footwell/defrost, cable for temperature flap and cable for central flap -1- into retainer -2- until it engages.



1. Expansion Tank
2. Intake Manifold
3. EGR Cooler
4. Connector
5. Heater Core
6. Coolant Center Line
7. ATF Cooler (Automatic Transmission Only)
8. Upper Radiator Hose
9. Lower Radiator Hose
10. Radiator
11. Oil Cooler
12. Water Pump/Thermostat
13. Cylinder Head/Cylinder Block

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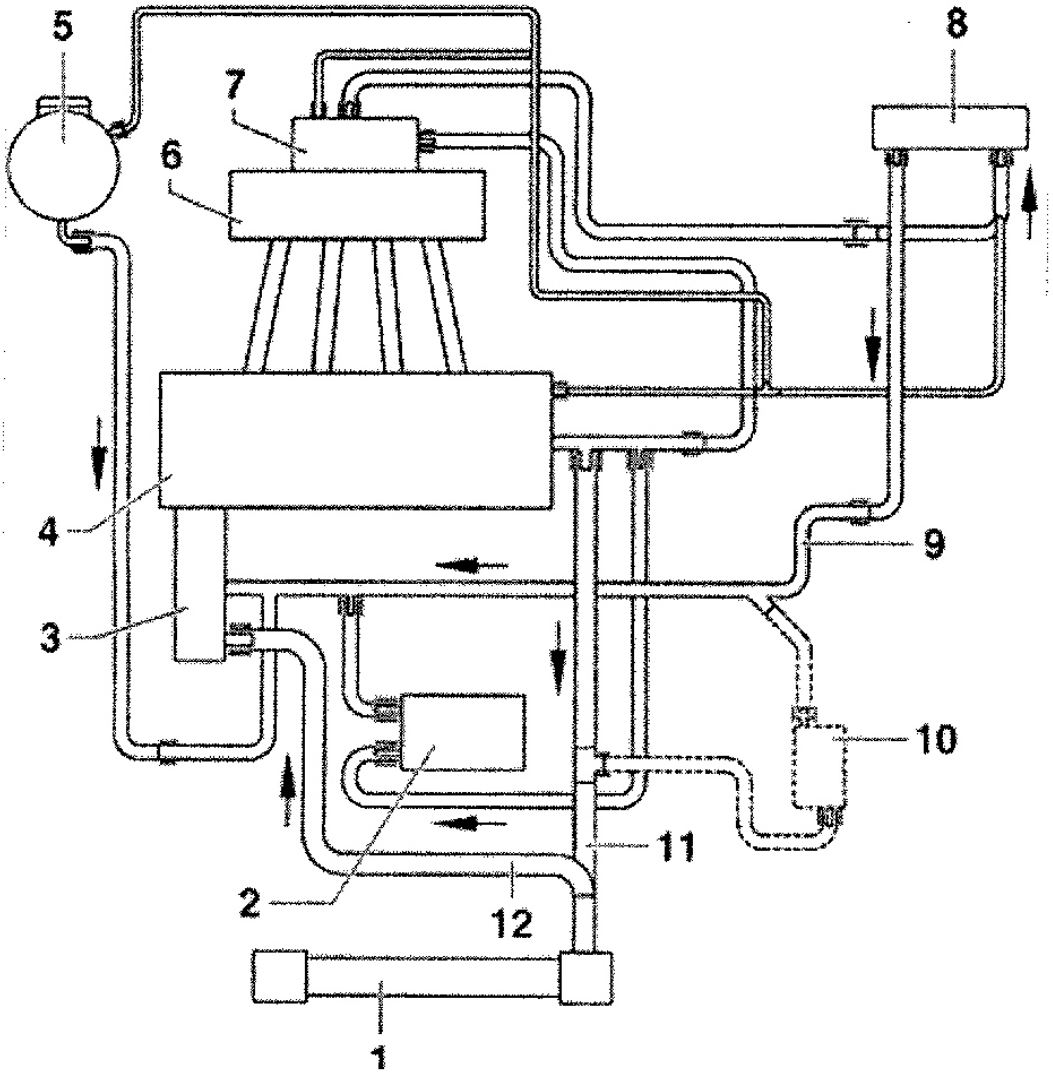
Fig. 31: Pressing Cable For Footwell/Defrost, Cable For Temperature Flap And Cable For Central Flap Into Retainer
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Cable color codes

- Footwell/defrost flap cable: green
- Central flap cable: yellow
- Temperature flap cable: beige
    - Check and adjust cables, See **Heating and A/C cables, installing and adjusting** .
    - Connect electrical connector
    - Fit controls into instrument panel opening and install mounting screws.

HEATING AND A/C CONTROLS, ASSEMBLY



1. Radiator
2. Oil Cooler
3. Water Pump
4. Engine Block
5. Expansion Tank
6. Intake Manifold
7. EGR Cooler
8. Heat Exchanger
9. Coolant Pipe
10. Transmission Cooler (Automatic Transmission Only)
11. Upper Radiator Hose
12. Lower Radiator Hose

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Fig. 32: Identifying Components Of Heating And A/C Controls Assembly
Courtesy of VOLKSWAGEN OF AMERICA, INC.

NOTE: **The following list refers to items in Fig. 32 .**

1. **Heating and A/C controls**
   - With A/C switch -E35-
   - With fresh air blower switch -E9-
   - With switch for fresh air blower and recirculated air -E184-
   - Removing and installing, See **Heating and A/C controls, removing and installing** .
2. **Illumination filter**
3. **Trim panel**
4. **Fresh air control lever light -L16-**
   - 12V, 1.2W
5. **Rotary control**
   - For blower speed
   - To remove: Use pliers with suitable plastic or rubber protection on jaws
6. **Rotary control**
   - For air distribution
   - To remove: Use pliers with suitable plastic or rubber protection on jaws
7. **Rotary control**
   - For interior temperature
   - To remove: Use pliers with suitable plastic or rubber protection on jaws

HEATING AND A/C CABLES, INSTALLING AND ADJUSTING

NOTE:

- **Cable sleeve ends are color coded.**
- **Check cables before installing. Replace binding or damaged cables.**
- **Attach cables to removed controls first and then attach to levers at heating/evaporator unit.**
- **All air flaps must audibly move onto end stops when turning controls.**

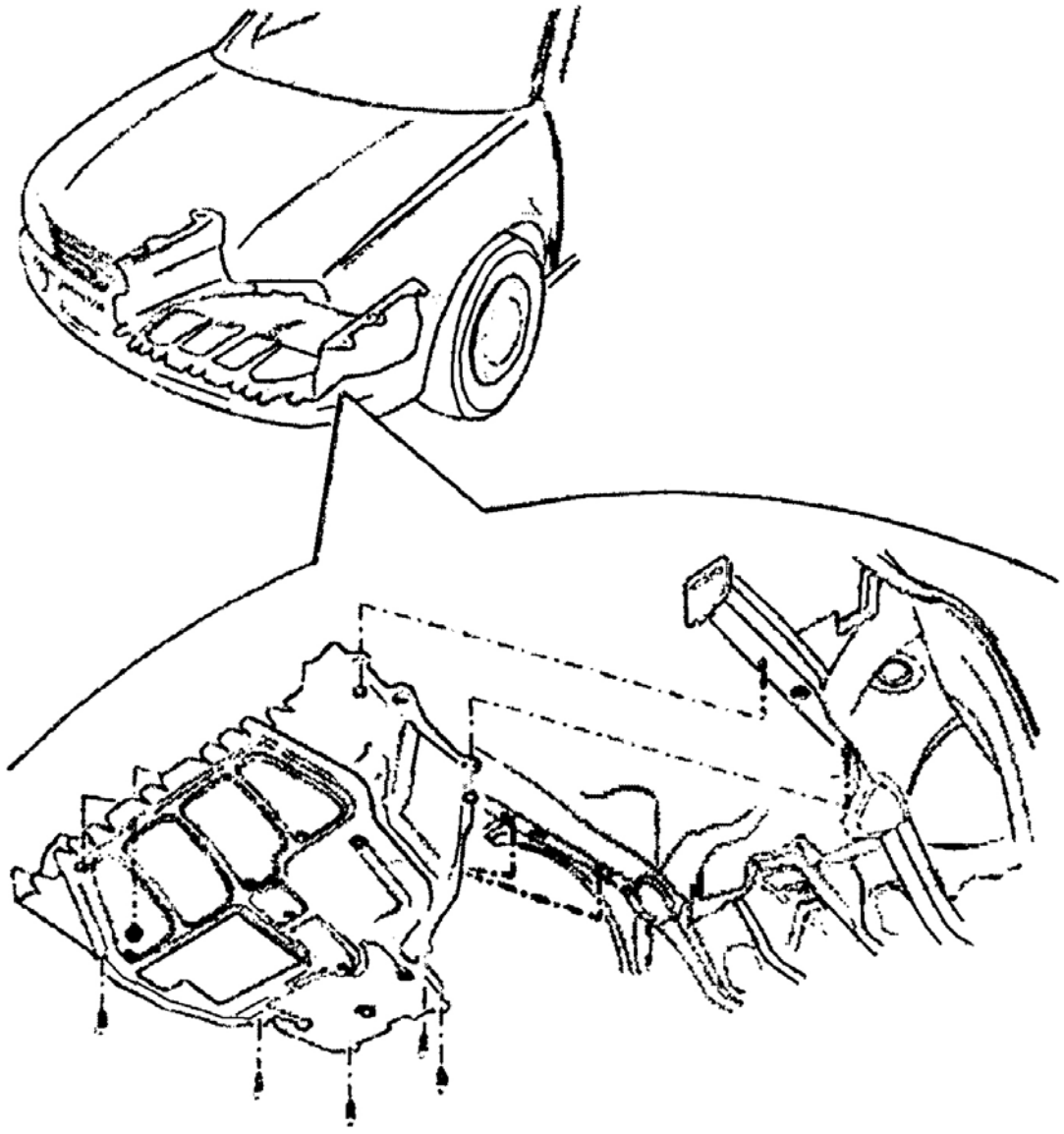

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Fig. 33: Installing Heating And A/C Cables
Courtesy of VOLKSWAGEN OF AMERICA, INC.

NOTE: The following list refers to items in Fig. 33 .

1. **Central flap cable**
   - From air distribution rotary control to central flap
   - Cable sleeve marking: Yellow
   - Installing and adjusting, See **Central flap cable, installing and adjusting** .

2. **Footwell/defrost flap cable**
    - From air distribution rotary control to footwell/defrost flap
    - Cable sleeve marking: Green
    - Removing:
        - Remove heating and A/C controls, See **Heating and A/C controls, removing and installing**
        - Unclip cable from controls
        - Remove steering column trim.

          See **TRIM UNDER STEERING COLUMN, REMOVING** .

        - Unclip cable at heater/evaporator unit.
    - Installing and adjusting, See **Footwell/defrost flap cable, installing and adjusting** .
3. **Heating and A/C controls**
    - Removing and installing, See **Heating and A/C controls, removing and installing** .
4. **Temperature flap cable**
    - From temperature rotary control to temperature flap
    - Cable sleeve marking: Beige
    - Installing and adjusting, See **Temperature flap cable, installing and adjusting** .

Temperature flap cable, installing and adjusting

Cable sleeve marking: Beige

Prerequisites:

- Heating and A/C controls are installed.
- Connecting duct removed, See **CONNECTING DUCT, REMOVING**

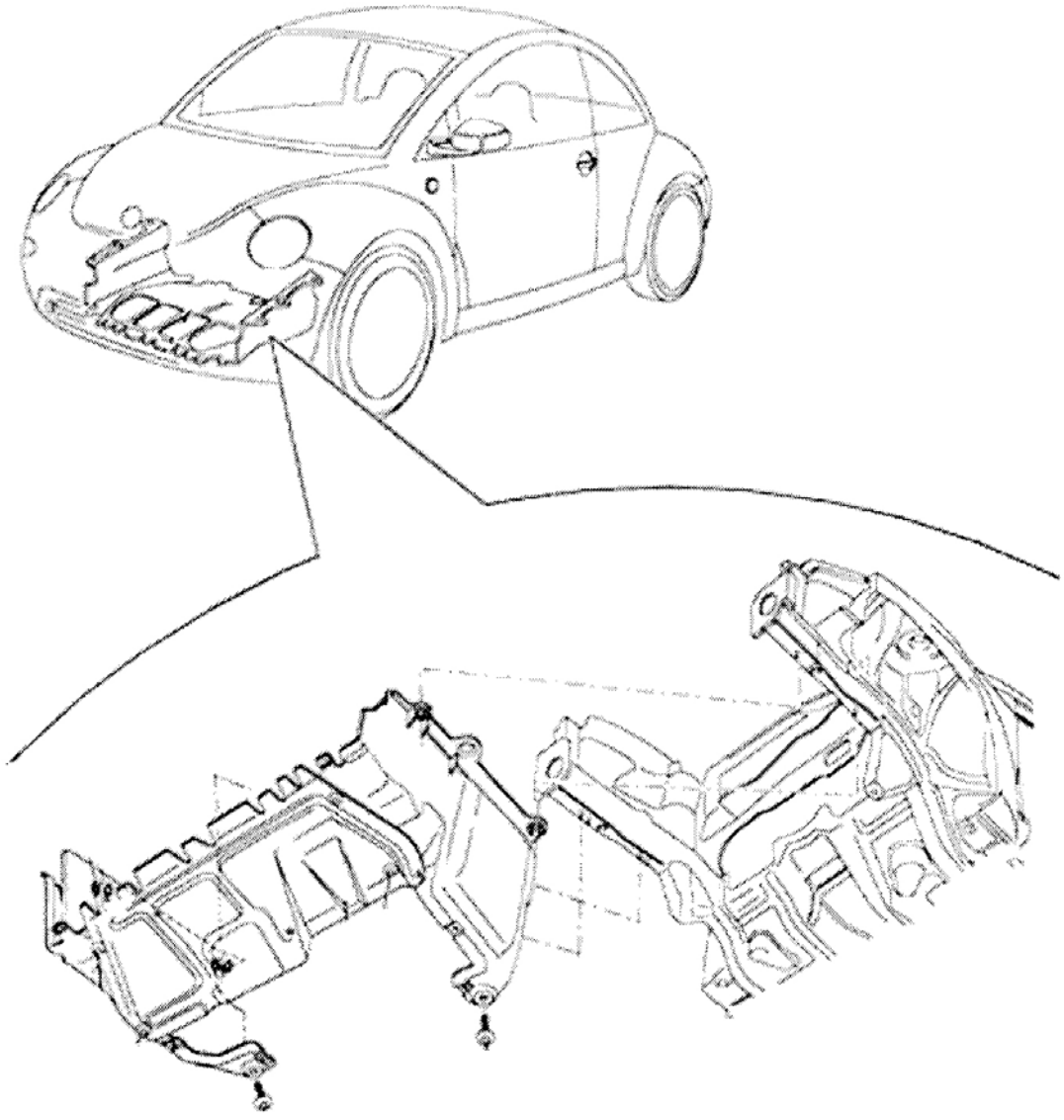

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Fig. 34: Installing & Adjusting Temperature Flap Cable
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Adjusting

- Turn temperature rotary control knob to left onto stop.
- Attach center wire of cable -1- to the temperature flap lever -2-. See **Fig. 34** .
- Push temperature flap lever -2- onto stop -arrow A- and secure outer cable -1- with clip -3-.
- Turn temperature rotary control knob to left and right onto stops.

When turning the rotary control knob both end stops must be reached.

Footwell/defrost flap cable, installing and adjusting

Cable sleeve marking: Green

Prerequisite:

- Heating and A/C controls are installed.

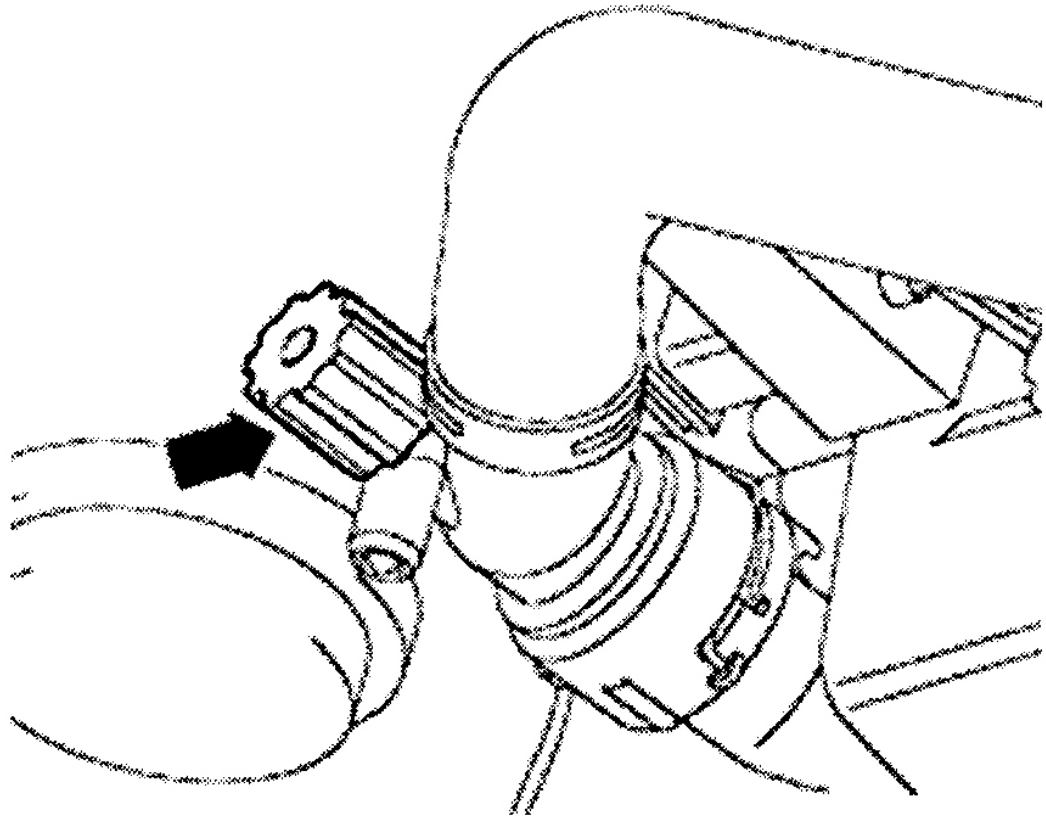

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Fig. 35: Installing & Adjusting Footwell/Defrost Flap Cable
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Adjusting

- Turn air distribution rotary knob to left onto stop.
- Attach end of cable -1- to the temperature flap lever -3-, arrow -A-. See **Fig. 35** .

- Press footwell/defrost flap lever onto stop arrow -C- and attach outer cable -1 - with clip -2-, arrow -B-.
- Turn air distribution rotary control knob to left and right onto stops.

  When turning the rotary control knob both end stops must be reached.

Central flap cable, installing and adjusting

Cable sleeve marking: Yellow

Prerequisites:

- Central flap lever correctly adjusted, See **INSTALLING & ADJUSTING CENTRAL FLAP CABLE**
- Heating and A/C controls are installed.
- Connecting duct removed, See **CONNECTING DUCT, REMOVING** .

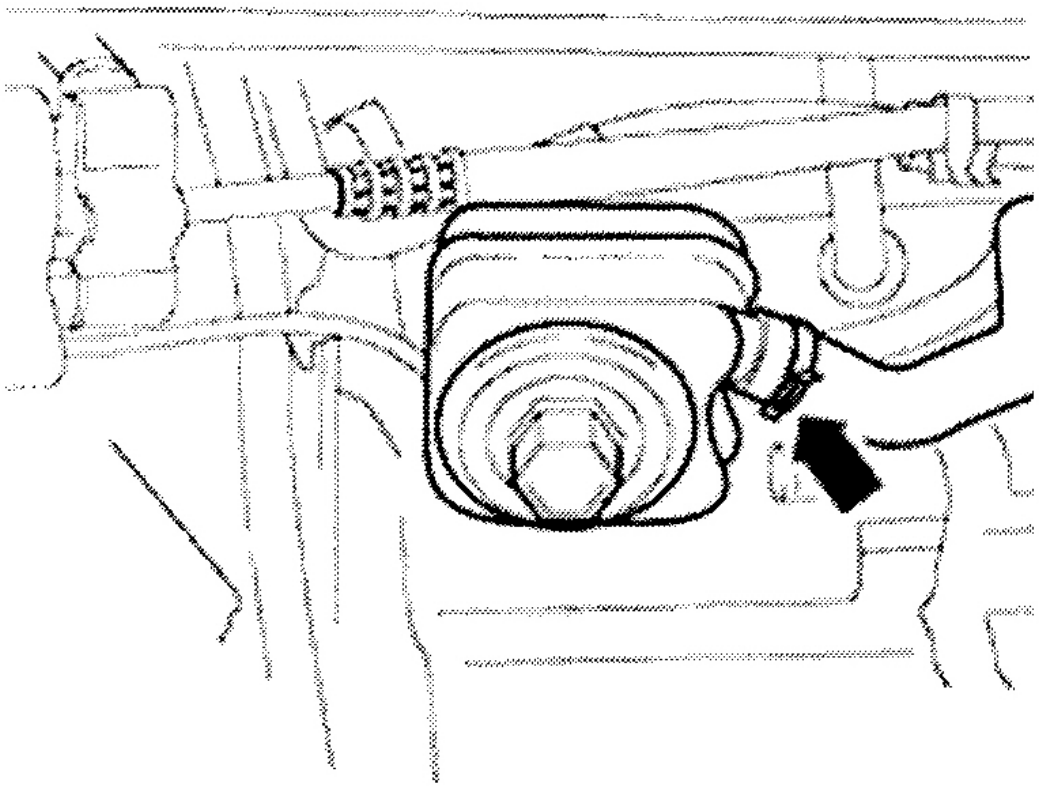

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Fig. 36: Installing & Adjusting Central Flap Cable

Courtesy of VOLKSWAGEN OF AMERICA, INC.

Adjusting

- Turn air distribution rotary control knob to left onto stop.
- Attach center wire of cable -2- to the central flap lever -1-. See **Fig. 36** .
- Press footwell/defrost flap lever onto stop arrow -A- and attach outer cable -2- with clip -3-.
- Turn air distribution rotary control knob to left and right onto stops.

When turning the rotary control knob both end stops must be reached.

COMPONENTS IN ENGINE COMPARTMENT, SERVICING

CAUTION: Before beginning repairs on the electrical system:

- **Obtain the anti-theft radio security code.**
- **Switch the ignition off.**
- **Disconnect the battery Ground (GND) strap.**
- **After reconnecting battery, re-code and check operation of anti-theft radio. Also check operation of clock and power windows according to Repair Manual and/or Owner's Manual.**
- **Immediately plug open connections on A/C components to prevent dirt and moisture contamination.**

NOTE:

- **Before carrying out any work on the A/C refrigerant system, refer to A/C refrigerant system safety measures, See A/C refrigerant system .**
- **System components identified with an * must only be serviced or replaced after discharging refrigerant system.**

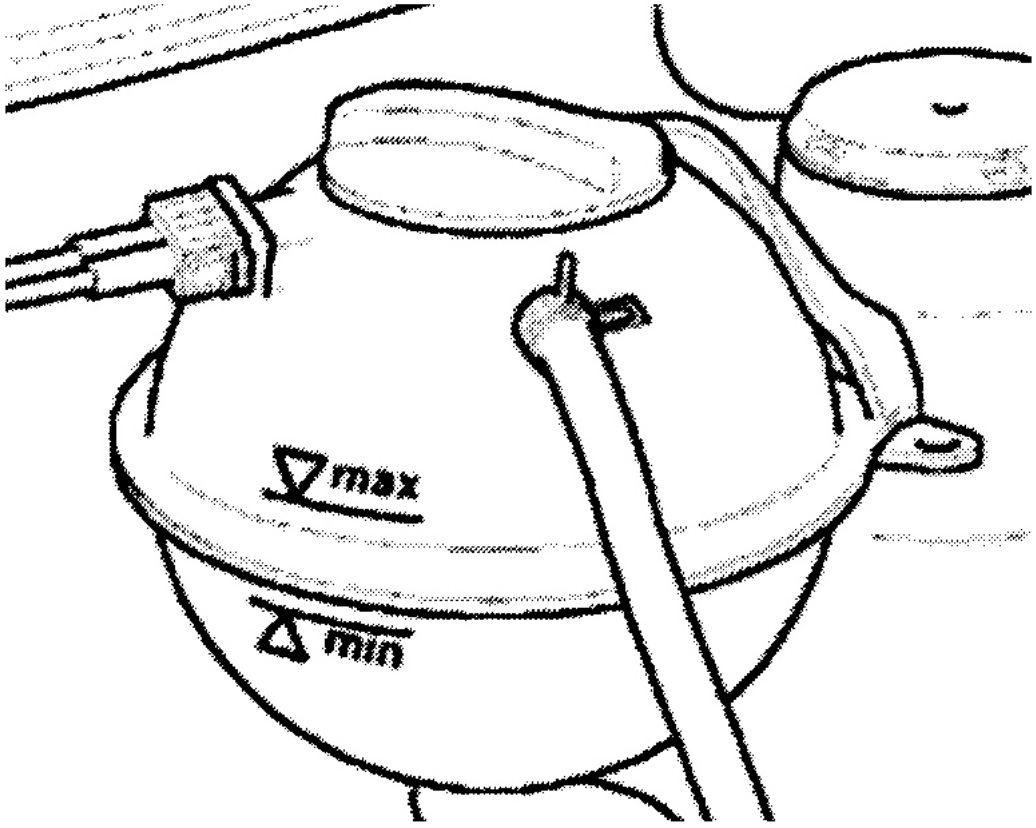

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Fig. 37: Identifying A/C Components In Engine Compartment
Courtesy of VOLKSWAGEN OF AMERICA, INC.

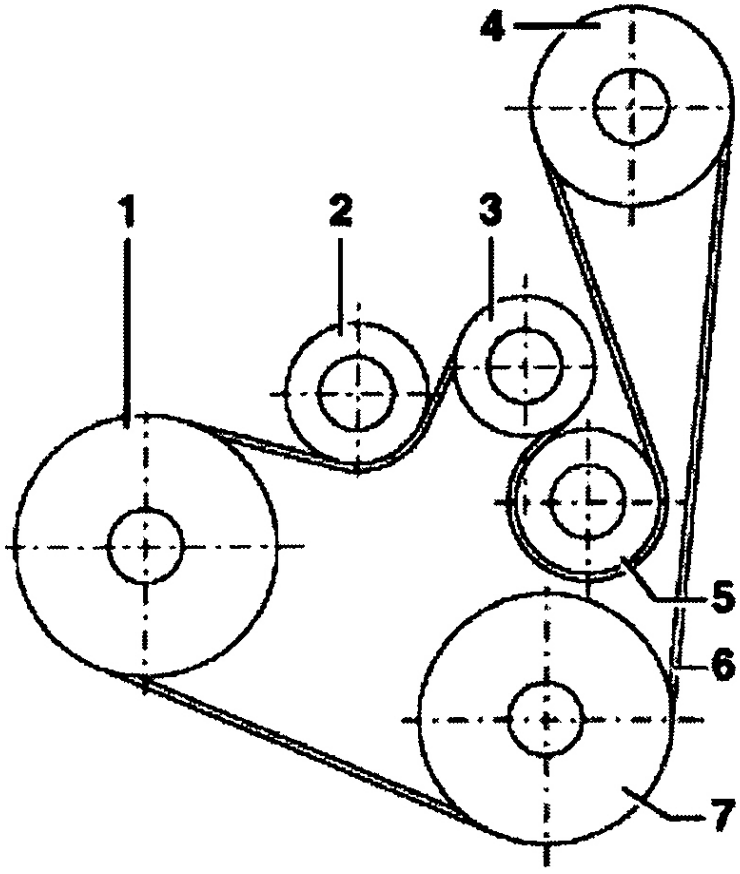
NOTE: The following list refers to items in Fig. 37 .

1. **Damper***
2. **Refrigerant hose***
   - With damper
3. **Refrigerant pipe***
4. **Ambient temperature switch -F38-**
   - Switches off A/C clutch -N25- at low ambient temperatures
   - Off at -1°C (30°F)
   - On at 7°C (45° F)
5. **Refrigerant pipe**

- From receiver drier to expansion valve

6. **Low pressure service valve**
   - Only use Kent Moore ACR4 or equivalent
7. **A/C pressure switch -F129- or high pressure sensor -G65-**
   - Depending on engine type, refrigerant systems have either an A/C pressure switch -F129- or high pressure sensor -G65- installed. Refer to system wiring diagrams.
   - Checking -F129-, See **A/C pressure switch -F129-, checking** .
   - Checking -G65-, See **High pressure sensor -G65-**
   - Removing and installing, See **Removing And Installing A/C Pressure Switch -F129- And High Pressure Sensor -G65-** .
   - Component can be removed without discharging refrigerant system
8. **Expansion valve***
9. **Evaporator water drain valve (Models From 06.00 And Up)**
   - New valve design, models from 06.00 and up, See **CHECKING EVAPORATOR WATER DRAIN VALVE - Models From 06.00 And Up** .
10. **Evaporator water drain valve (models Up To 06.00)**
    - Checking models Up To 06.00, See **CHECKING EVAPORATOR WATER DRAIN VALVE - Models Up To 06.00**
11. **A/C cut-out thermal switch -F163-**
    - Switches off A/C clutch -N25- at excessively high coolant temperature
    - Off at 119°C (246°F)
    - On at 112°C (234°F)
12. **Coolant fan control (FC) control module -293-**
13. **Refrigerant hose***
    - From compressor to condenser
14. **Refrigerant hose**
    - From expansion valve to compressor
    - With damper
15. **Pressure relief valve***
    - On compressor
    - Checking see **Pressure relief valve** .
16. **Condenser***
17. **Compressor***
    - Sanden SD7-V16
18. **A/C clutch -N25-**
    - Servicing, See **A/C clutch -N25-, servicing (Sanden)** .
19. **Receiver drier***

Checking Evaporator Water Drain Valve - Models Up To 06.00



1- Vibration damper/pulley
2- Tensioner
3- Pulley-generator
4- Pulley-power steering pump
5- Idler pulley
6- Ribbed belt
7- Pulley-A/C compressor

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Fig. 38: Evaporator Water Drain Valve - Models Up To 06.00
Courtesy of VOLKSWAGEN OF AMERICA, INC.

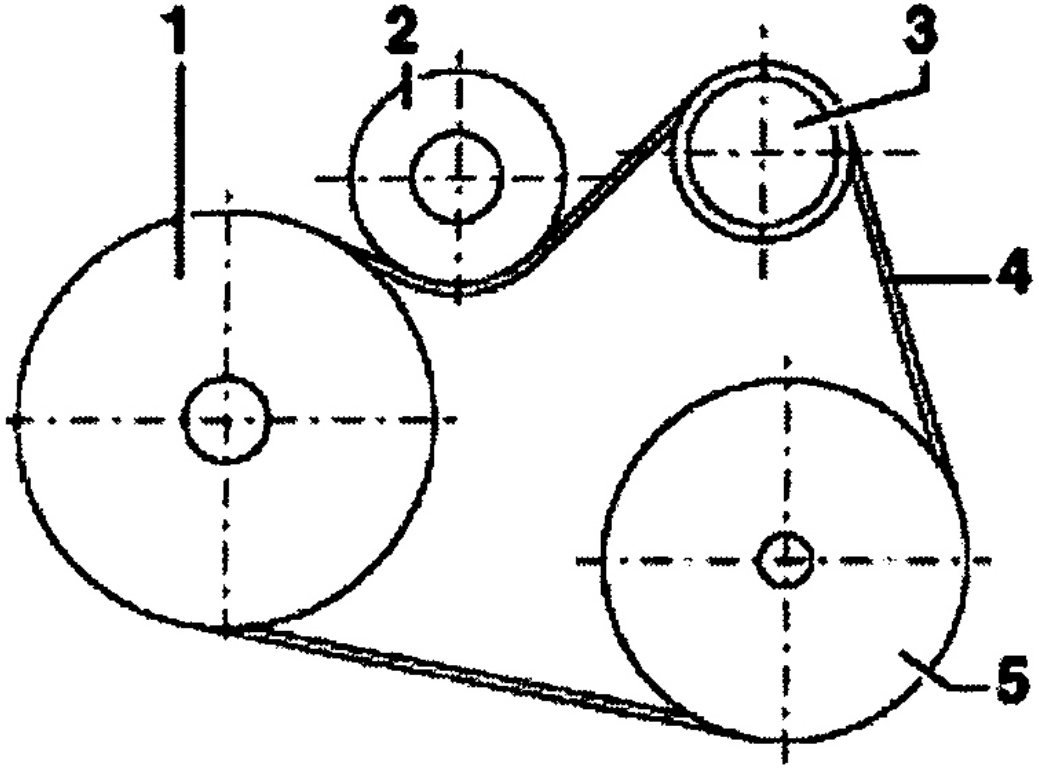
- Fold cover -1- in bulkhead insulation mat -3- upwards.
- Remove drain valve -2- from opening in bulkhead -4-.

Check water drain valve as follows to ensure correct function:

- The water drain valve must not be stuck together.
- Insulation mat must not be deformed or damaged in the area of water drain valve.
- The opening in the sealing cap of the water drain valve must point downwards.

NOTE: When the cover cap -1- is closed it must be flush with the insulation matting. If the cover cap -1- is pushed in too far, the water drain valve sealing cap -2- can become jammed.

Checking Evaporator Water Drain Valve - Models From 06.00 And Up



1- Vibration damper/pulley
2- Tensioner
3- Pulley-generator
4- Ribbed belt
5- Pulley-power steering pump

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Fig. 39: Evaporator Water Drain Valve - Models From 06.00 And Up
Courtesy of VOLKSWAGEN OF AMERICA, INC.

NOTE: Design of new evaporator drain valve from 06.00 is essentially maintenance

free.

COMPRESSOR BRACKET, REMOVING AND INSTALLING

2.0L 4-CYLINDER GASOLINE ENGINE

Special tools, testers, measuring instruments and auxiliary items required

- Torque wrench (5-50 N.m)

NOTE: **The compressor bracket and related components can be removed and installed without having to open the refrigerant circuit.**

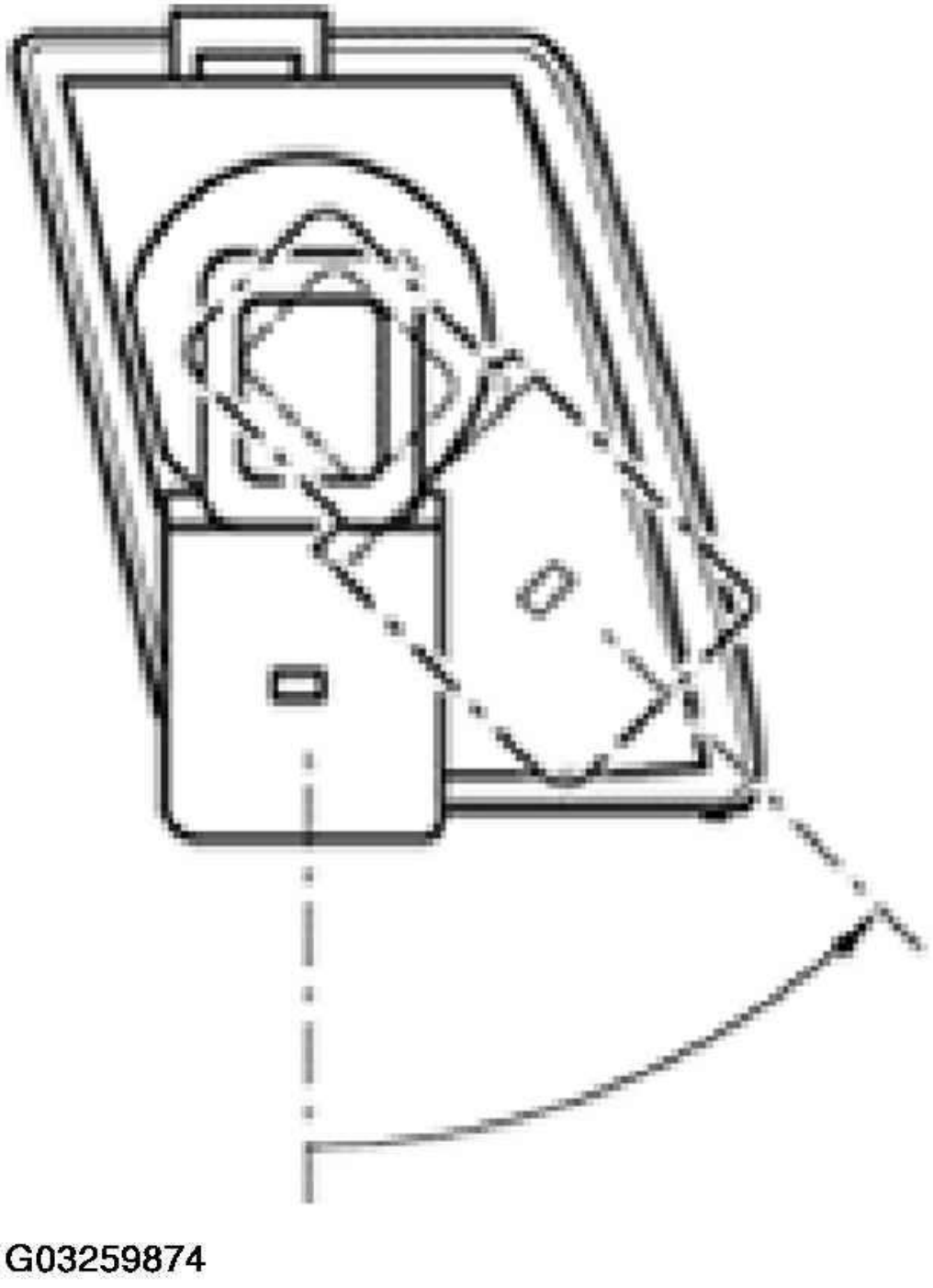


Fig. 40: Compressor Bracket (2.0L 4-Cylinder Gasoline Engine)

Courtesy of VOLKSWAGEN OF AMERICA, INC.

NOTE: The following list refers to items in Fig. 40 .

1. **Tensioning roller**
2. **Generator (GEN)**
   - Removing:

     See **GENERATOR** .
3. **Bracket**

   Mounting for:

   - Generator
   - Compressor
   - Power steering pump
   - Removing:
     - Remove ribbed belt

       See **RIBBED BELT, REMOVING AND INSTALLING** .
     - Remove Generator (GEN)

       See **GENERATOR** .
     - Remove power steering pump

       See **POWER STEERING PUMP: VEHICLES WITH POWER STEERING PUMP IN LOWER SECTION, REMOVING AND INSTALLING** or **POWER STEERING PUMP: VEHICLES WITH POWER STEERING PUMP IN UPPER SECTION, REMOVING AND INSTALLING** .
     - Remove bolts -7-.
     - Remove compressor from bracket, swing away and secure in engine compartment with wire.
     - Remove bolts -4-(Qty. 4).
     - Remove compressor bracket from engine.
4. **Hex head bolt**
   - Qty. 4
   - M10X55
   - 50 N.m (37 ft. lb)
5. **Power steering pump**

- Removing:

  See **POWER STEERING PUMP: VEHICLES WITH POWER STEERING PUMP IN LOWER SECTION, REMOVING AND INSTALLING** or **POWER STEERING PUMP: VEHICLES WITH POWER STEERING PUMP IN UPPER SECTION, REMOVING AND INSTALLING** .

6. **Compressor**
   - Sanden SD7-V16
   - With A/C clutch -N25-
   - A/C clutch -N25-, servicing, See **A/C clutch -N25-, servicing (Sanden)**
7. **Hex head combination bolt**
   - M10X112
   - 45 N.m (33 ft. lb)

1.9L4-CYLINDER TDI ENGINE

Special tools, testers, measuring instruments and auxiliary items required

- Torque wrench (5-50 N.m)

NOTE: The compressor bracket and related components can be removed and installed without having to open the refrigerant circuit.

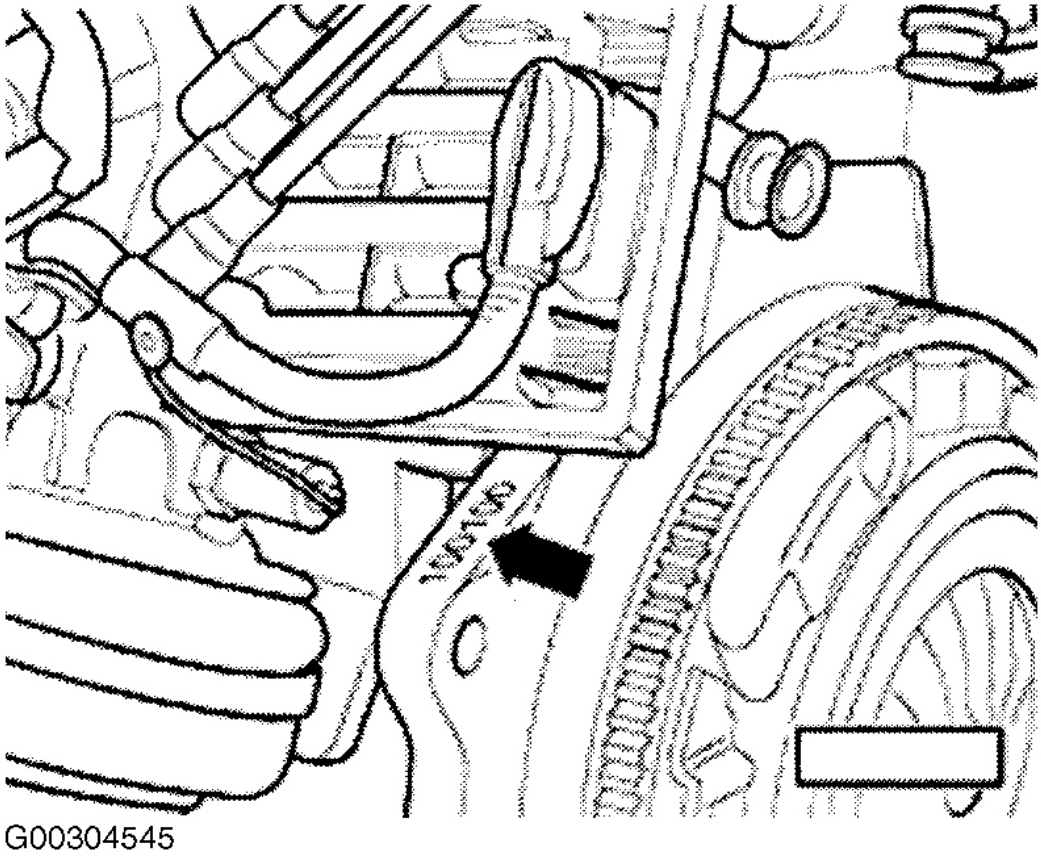


Fig. 41: Compressor Bracket (1.9L 4-Cylinder TDI Engine)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

NOTE: The following list refers to items in Fig. 41 .

1. **Bracket**

   Mounting for:

   - Generator
   - Compressor
   - Power steering pump
   - Diesel Direct Fuel Injection (DFI) Pump
   - Removing:
     - Remove ribbed belt.

See **RIBBED BELT, REMOVING AND INSTALLING** .

- Remove Generator (GEN)

  See **GENERATOR** .

- Remove power steering pump

  See **POWER STEERING PUMP: VEHICLES WITH POWER STEERING PUMP IN LOWER SECTION, REMOVING AND INSTALLING** or **POWER STEERING PUMP: VEHICLES WITH POWER STEERING PUMP IN UPPER SECTION, REMOVING AND INSTALLING** .

- Remove Diesel Direct Fuel Injection (DFI) pump

  See DIESEL DIRECT FUEL INJECTION (DFI) PUMP, REMOVING .

- Remove bolt -7-.
- Remove compressor from bracket, swing away and secure in engine compartment with wire.
- Remove bolts -4-(Qty. 4).
- Remove compressor bracket from engine.

2. **Diesel Direct Fuel Injection (DFI) injection pump**
   - Removing:

     See **DIESEL INJECTION PUMP, REMOVING AND INSTALLIN** .

3. **Power steering pump**
   - Removing:

     See **POWER STEERING PUMP: VEHICLES WITH POWER STEERING PUMP IN LOWER SECTION, REMOVING AND INSTALLING** or **POWER STEERING PUMP: VEHICLES WITH POWER STEERING PUMP IN UPPER SECTION, REMOVING AND INSTALLING** .

4. **Hex head combination bolt**
   - M10X65
   - 45 N.m (33 ft. lb)
5. **Hex head combination bolt**
   - M10X45
   - 45 N.m (33 ft. lb)
6. **Compressor**
   - Sanden SD7-V16
   - With A/C clutch -N25-

- A/C clutch -N25-, servicing, See **A/C clutch -N25-, servicing (Sanden)**

7. **Hex head combination bolt**
   - Qty. 2
   - M10X112
   - 45 N.m (33 ft. lb)
8. Idler pulley
   - Assembly, See **Fig. 42**
9. **Generator (GEN)**
   - Removing:

     See **GENERATOR**

10. **Ribbed belt**
    - Removing:

      See **RIBBED BELT, REMOVING AND INSTALLING** .

    - Routing, See **Fig. 43**

Idler Pulley Assembly

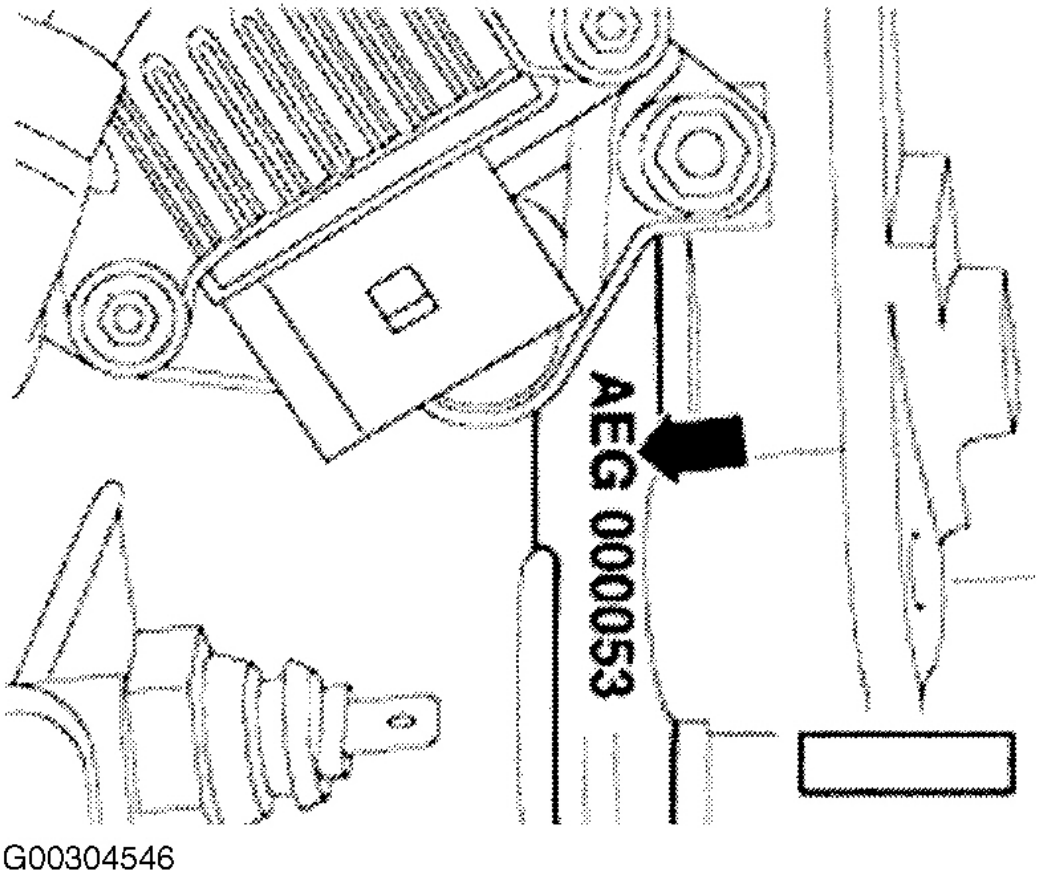


Fig. 42: Identifying Idler Pulley Assembly
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Serpentine Drive (Ribbed) Belt Routing

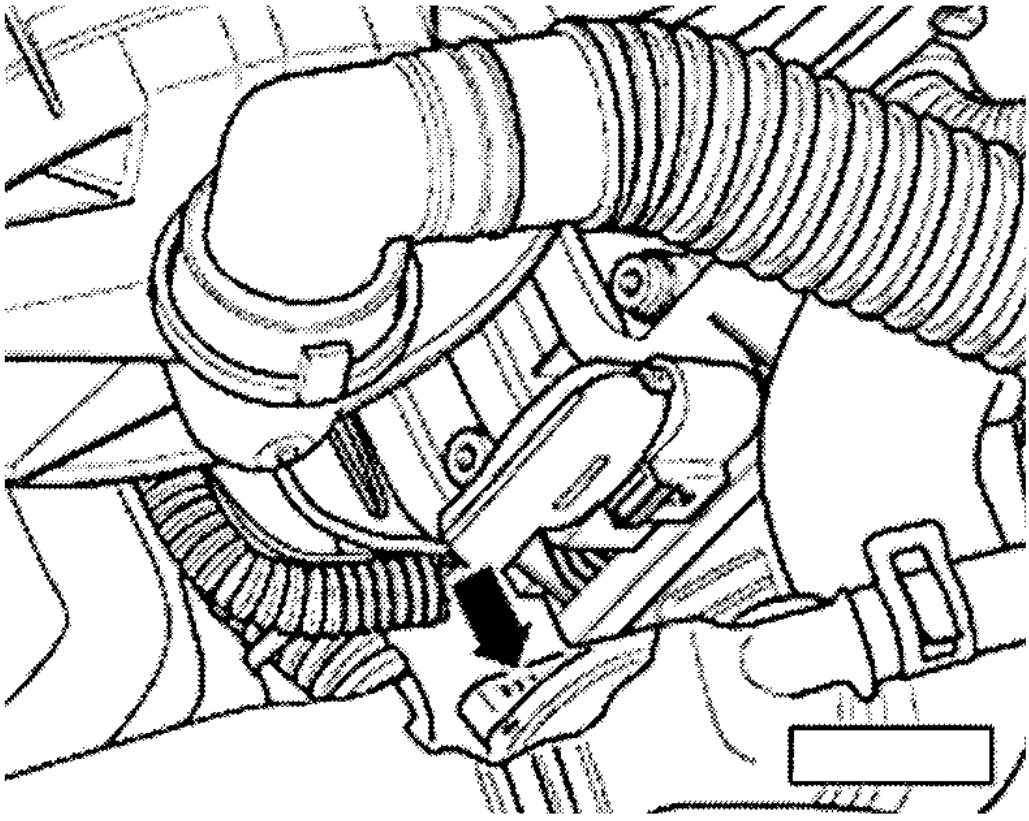


Fig. 43: Serpentine Drive (Ribbed) Belt Routing
Courtesy of VOLKSWAGEN OF AMERICA, INC.

NOTE: When installing the belt ensure it is correctly seated in the pulley.

A/C CLUTCH -N25-, SERVICING (SANDEN)

Notes

NOTE: Refrigerant circuit does not need to be discharged to service A/C clutch.

If A/C clutch is to be serviced with compressor installed, first do the following:

- Remove ribbed belt. See **RIBBED BELT, REMOVING AND INSTALLING** .
- Remove intercooler (engine code ALH only). See **CHARGE AIR COOLER COMPONENTS, REMOVING AND IN** .

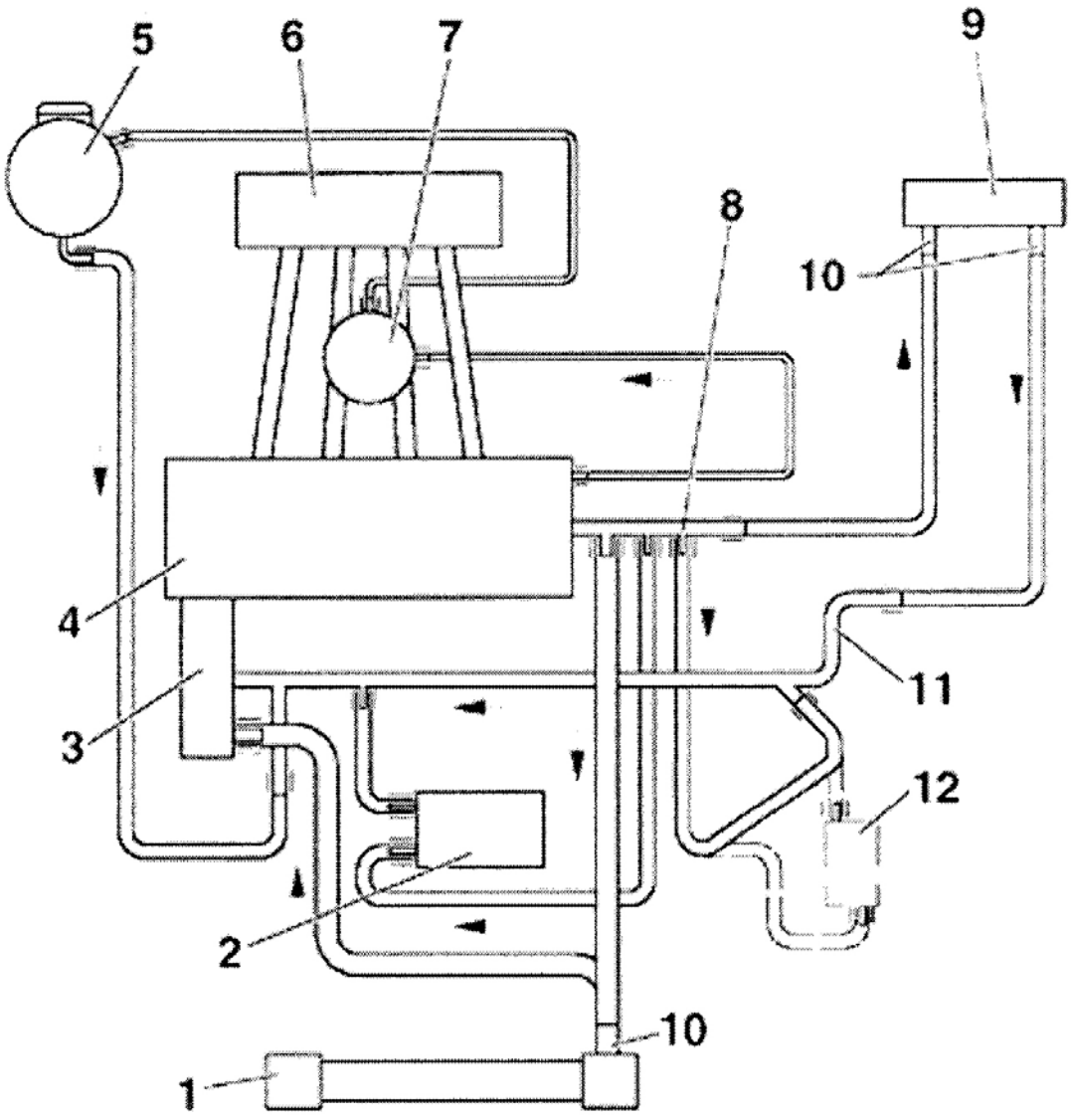
If A/C clutch is to be serviced with compressor removed, first do the following:

- Discharge refrigerant system. See **A/C refrigerant system, discharging** .

For A/C clutch removing and installing, See **A/C clutch -N25-, removing and installing** .

For A/C refrigerant system servicing, See **A/C refrigerant system, servicing** .

A/C clutch -N25-



1. Radiator
2. Oil Cooler
3. Water Pump/Thermostat
4. Cylinder Head/Cylinder Block
5. Expansion Tank
6. Intake Manifold
7. Throttle Valve Control Module
8. Connecting Unions
9. Heat Exchanger
10. Quick-Action Coupling
11. Coolant Pipe
12. ATF Cooler (Automatic Transmission Only)

Fig. 44: Identifying Components Of A/C Clutch -N25- (Sanden)
Courtesy of VOLKSWAGEN OF AMERICA, INC.

NOTE: The following list refers to items in Fig. 44 .

1. **Hex nut**
   - Self-locking
   - Always replace
   - 15 N.m (11 ft. lb)
   - Removing and installing, See **Hex nut, removing and installing**
2. **Clutch plate**
   - Removing, See **A/C clutch -N25-, removing and installing**
   - Checking clutch plate gap, See **Clutch plate gap, checking**
3. **Shims**
   - Used to adjust gap between clutch plate and pulley
   - Gap: 0.4-0.8 mm (0.015-0.023 in)
4. **Circlip**
   - Always replace
     - Install correctly: Flat side faces compressor.
   - Ensure correct seating in groove
5. **Clutch pulley**
   - Removing, See **Clutch pulley, removing**
6. **Circlip**
   - Replacing
     - Install correctly: Flat side faces compressor
   - Ensure correct seating in groove
7. **Clutch coil**
   - Installing, See **Clutch coil, installing**

   NOTE: A thermo-fuse integrated into the clutch coil protects the A/C clutch in the event of overheating (e.g.: due to a binding compressor). The clutch coil circuit is interrupted.

8. **Connector clip**
   - With screw
9. **Harness clip**
10. **Harness clip**
11. **Screw**
12. **Compressor**

13. **Threaded bushing**

A/C CLUTCH -N25-, REMOVING AND INSTALLING

Special tools, testers, measuring instruments and auxiliary items required

- Tool 3212 A (or equivalent)
- Two arm puller
- Three arm puller
- Depth gauge
- Torque wrench (5-50 N.m)

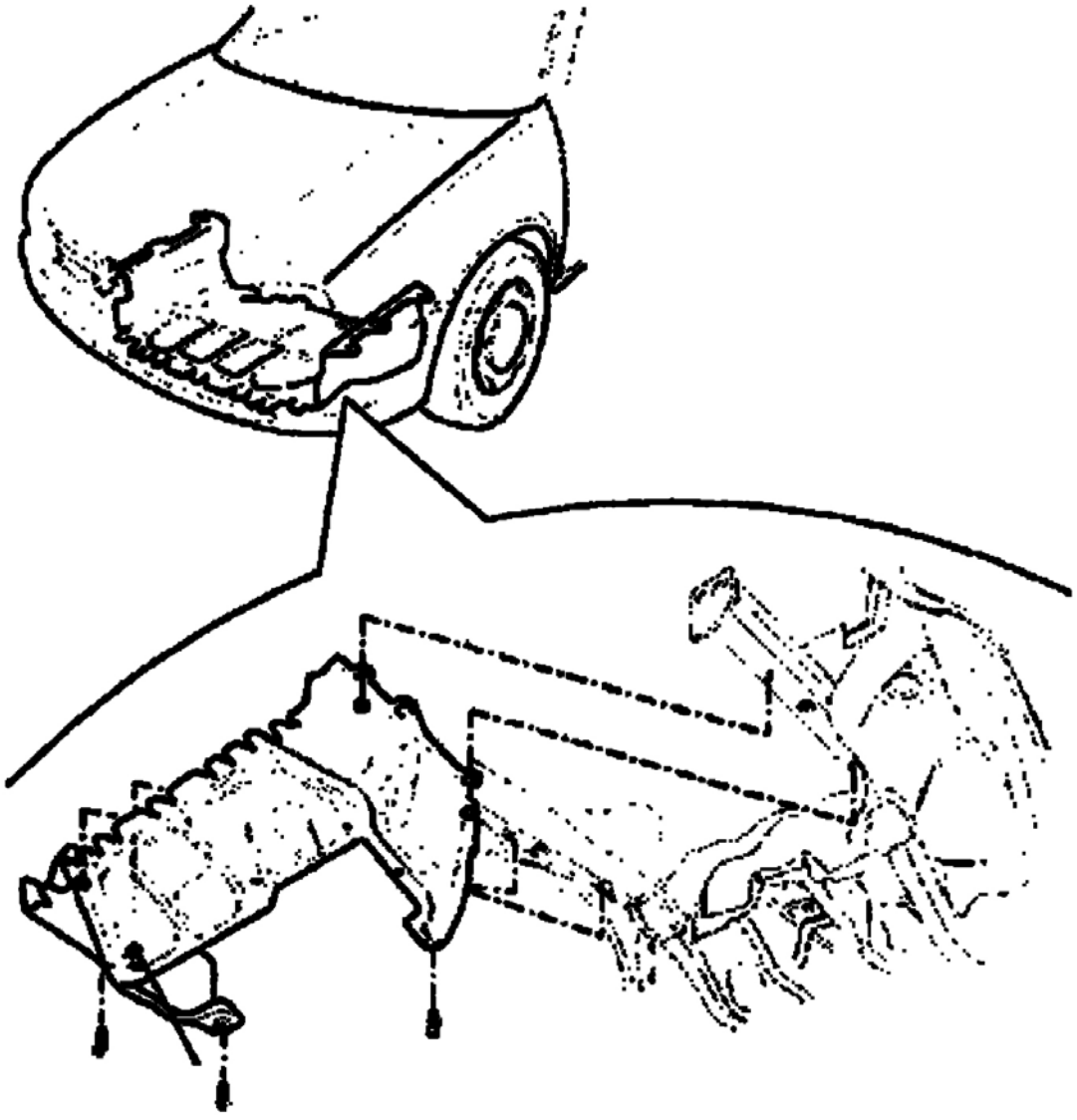


Fig. 45: Identifying Special Tool 3212
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Notes

- It is not necessary to discharge the refrigerant system to remove and install the A/C clutch.
- If A/C clutch is to be removed with compressor installed, first do the following:
  - Remove ribbed belt. See **RIBBED BELT, REMOVING AND INSTALLING** .
  - Remove intercooler (engine code ALH only). See **CHARGE AIR COOLER COMPONENTS, REMOVING AND IN** .

- If A/C clutch is to be removed with compressor removed, first discharge refrigerant system. See **A/C refrigerant system, discharging** .

Hex nut, removing and installing

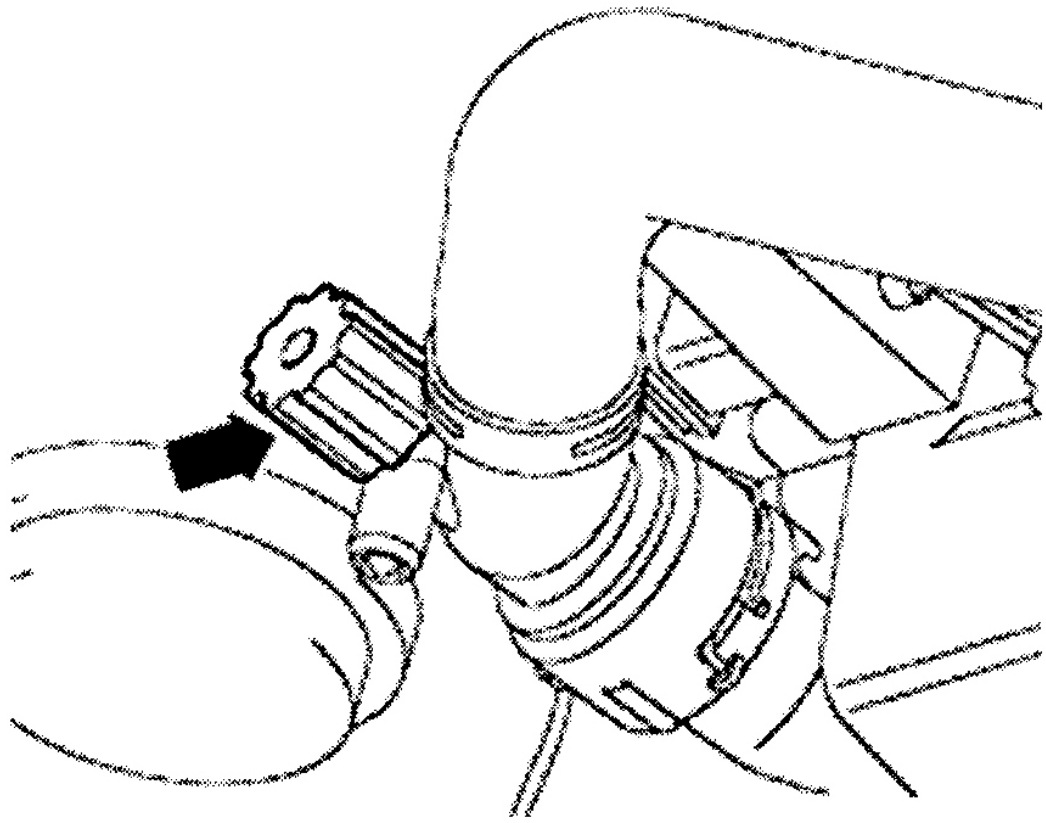


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Fig. 46: Removing And Installing Clutch Plate Hex Nut
Courtesy of VOLKSWAGEN OF AMERICA, INC.

- Tightening torque: 15 N.m (11 ft. lb)
  - Remove hex nut while counter-holding with 3213A or equivalent commercially available 2 hole pin wrench (with 4 mm pins).

Clutch plate, removing

- Carefully pry off clutch plate using two large screwdrivers -A-.

  Use locally available 2 or 3 arm puller if plate is securely seated (difficult to remove).

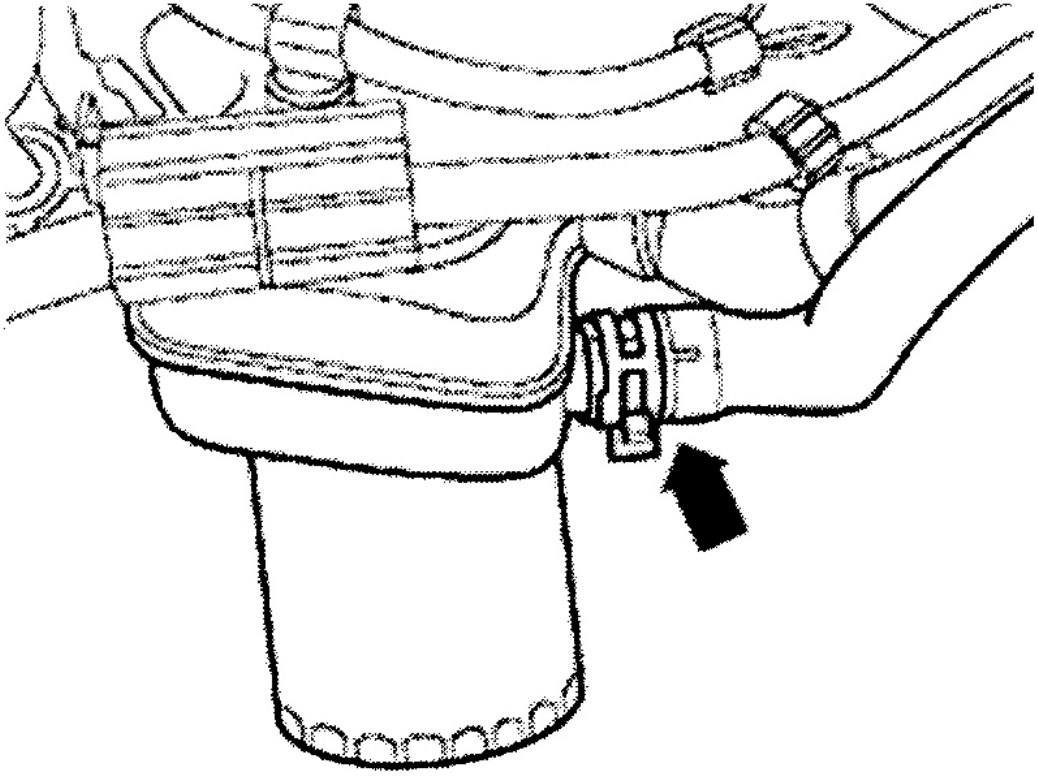

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Fig. 47: Removing Clutch Plate
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Clutch pulley, removing

- Remove circlip, see **A/C CLUTCH -N25-, SERVICING (SANDEN)**
- Attach commercially available 2 arm puller -A- on shoulder -B- and pull off pulley.

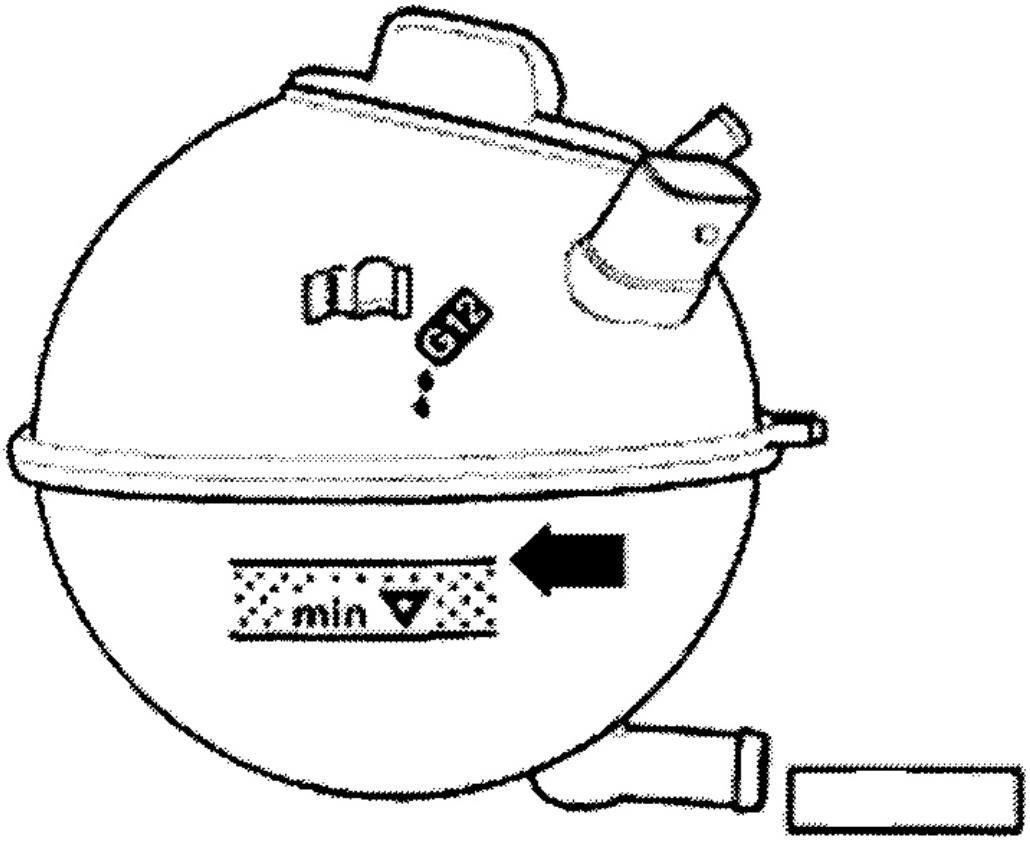

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Fig. 48: Removing Clutch Pulley
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Clutch coil, installing

- Install coil on compressor.
- Locate locking pin on coil -A- into recess -C-.

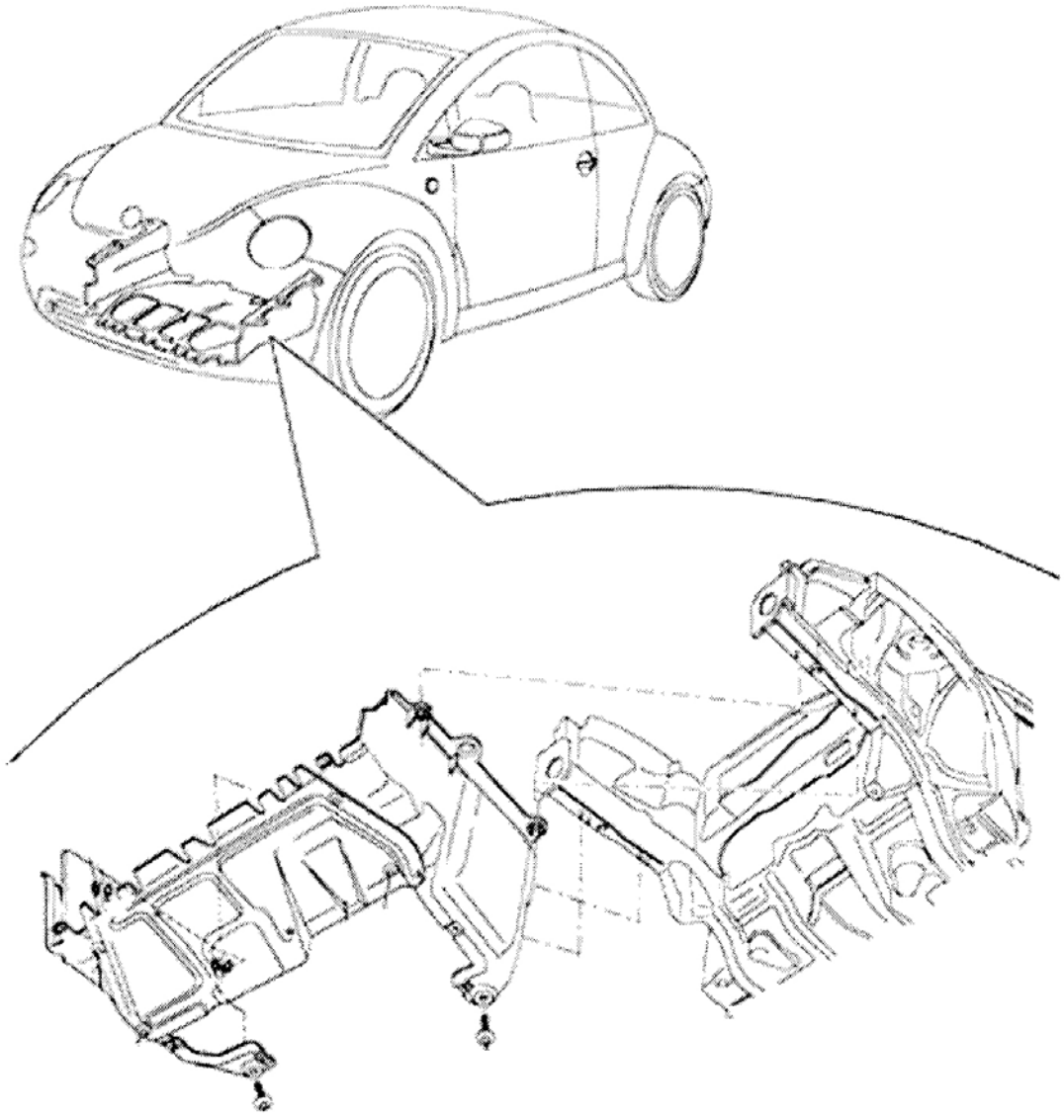

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Fig. 49: Installing Clutch Coil
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Clutch plate gap, checking

- Gap: 0.4 - 0.8 mm (0.015 - 0.023 in)

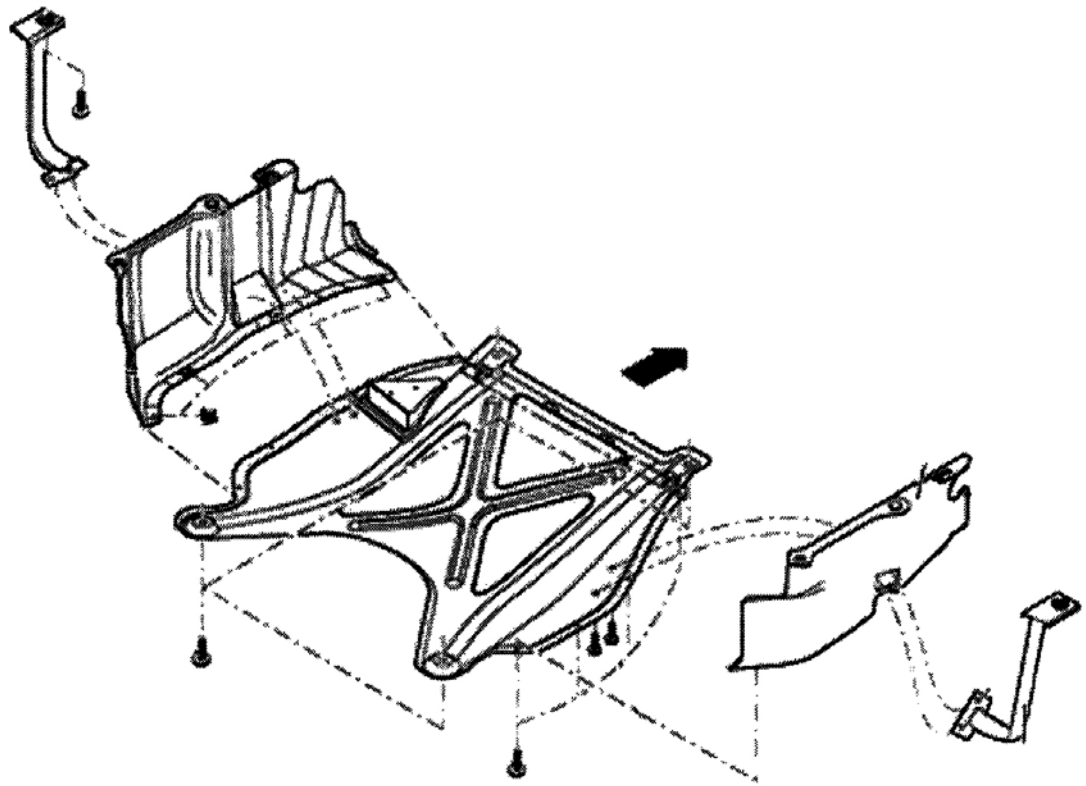

Fig. 50: Checking Clutch Plate Gap
Courtesy of VOLKSWAGEN OF AMERICA, INC.

Determine "Dimension 1"

- Using depth gauge -1-, measure gap between top of clutch plate -3- and clutch pulley -2- at three equally spaced locations (measurement must not deviate). See **Fig. 50** .

Determine "Dimension 2"

- If compressor is installed in vehicle, disconnect compressor electrical connector -4- from vehicle wiring harness. See **Fig. 50** .
- Using a jumper wire, energize the clutch coil by applying 12V to connector -A- (battery terminal B+). If compressor is removed from vehicle, compressor must be grounded.
- With clutch energized, measure gap between pulley -2- and clutch plate -3- with depth gauge -1-.

  The allowable gap (0.4-0.8 mm / 0.015-0.023 in) is the difference between "Dimension 1" and "Dimension 2".

NOTE:

- **Gap must be within tolerance around entire circumference.**

- **If gap is outside the permitted tolerance range, remove clutch plate and adjust gap by adding or removing shims. See Fig. 44 .**